

Beaver City

Transportation Master Plan



Beaver City

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CarterBurgess



ADOPTED
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INTRODUCTION

1.1 Background

Beaver City is a vibrant community located in the southeastern part of Beaver County at the base of the Tushar Mountains in the Fishlake National Forest. Beaver City is the county seat and the largest city in Beaver County, which has three incorporated towns and cities. Beaver City is located 105 miles north of St. George and 212 miles south of Salt Lake City.

Beaver County enjoys all the advantages of a small community in an environmentally balanced area of high desert and mountain ranges. The Tushar Mountain Range in the Fishlake National Forest offers an abundant recreation resource. Elk Meadows Resort, and Puffer Lake Resort are renowned for their excellent hiking, fishing, hunting, and skiing. West of Beaver are the Mineral Mountains and the towns of Minersville and Milford including Minersville State Park and Reservoir. Beaver City encompasses an area of 3151 acres. Beaver City has a rural lifestyle, put with access to I-15 it makes an ideal place for business relocation and/or development.



Mayor Bradshaw takes a direct interest in the Beaver City Transportation Master Plan

One of Beaver's claims to fame is that it is the birthplace of Butch Cassidy (1856). In the town's early days, there was a mining boom which brought in many "outsiders" to the predominantly Mormon town. The two lifestyles did not mix well and there was much unrest in Beaver until the mining waned. Today, the area is known for its hunting and fishing and other recreational activities.

The State transportation system includes Interstate 15, State Routes (SR) 21, 153 and 160. Interstate 15 is a four-lane facility that is the westerly boundary for a majority of the city. SR-21 enters Beaver from Milford as Center Street and terminates at Main Street (SR-160). SR-153 originates at Main Street (SR-160) and continues east through the Beaver River canyon and over the Tushar Mountain range towards Junction. Main Street (SR-160) connects the south Interstate 15 interchange with the northern Interstate 15 interchange and serves the central business district of Beaver City.

Travelers along I-15 frequent businesses at both of the interchanges. The south interchange mostly attracts cars with few trucks, while the north interchange attracts a more balanced mixture of cars and trucks. A smaller percentage of vehicles that exit I-15 travel into or through Beaver along Main Street (SR-160).

1.2 Study Need

Beaver City has seen a 22.8% population increase within the last decade. This combined with the rapid growth in St. George and increased traffic on I-15 culminates in a heightened awareness of the importance of having a well-established transportation master plan. Beaver City currently has two interchanges on I-15, one is located on the north end of town and the other on the south end. Both of these locations are experiencing economic growth, but this growth has come at a price to the economic growth of down town Beaver City. Because Beaver desires to maintain a strong economically viable, centralized, business district, they recognize the importance of influencing traffic patterns.



City Manager Steve Atkin takes the lead in the Beaver City Transportation Master Plan.

Some of the major transportation issues in Beaver City are as follows:

- Safety
- Parking
- Signals
- City gateway aesthetics
- Internal circulation (mobility)
- Property access
- Truck traffic
- Speed limits
- Additional interchanges

Beaver City recognizes the importance of building and maintaining safe roadways, not only for the auto traffic but also for the pedestrians and bicyclists. Adequate parking along Main Street is also a concern; with continued growth this will only become a bigger issue. Beaver City currently does not have a traffic signal within the city boundaries. A number of requests and comments have been made to UDOT and City officials about the need to have a signal at Main Street and Center Street.

1.3 Study Purpose

The purpose of this study is to develop a transportation master plan for Beaver City and evaluate the influence of the plan on the surrounding communities. This plan should be

adopted by Beaver City as part of the city's General Plan. With the transportation master plan in place the city can qualify for grants from the State Quality Growth Commission.

The primary objective of the study is to establish a solid transportation master plan to guide future developments and roadway expenditures. The plan includes two major components:

Five-year, short-range action plan

Thirty-year, long-range transportation plan

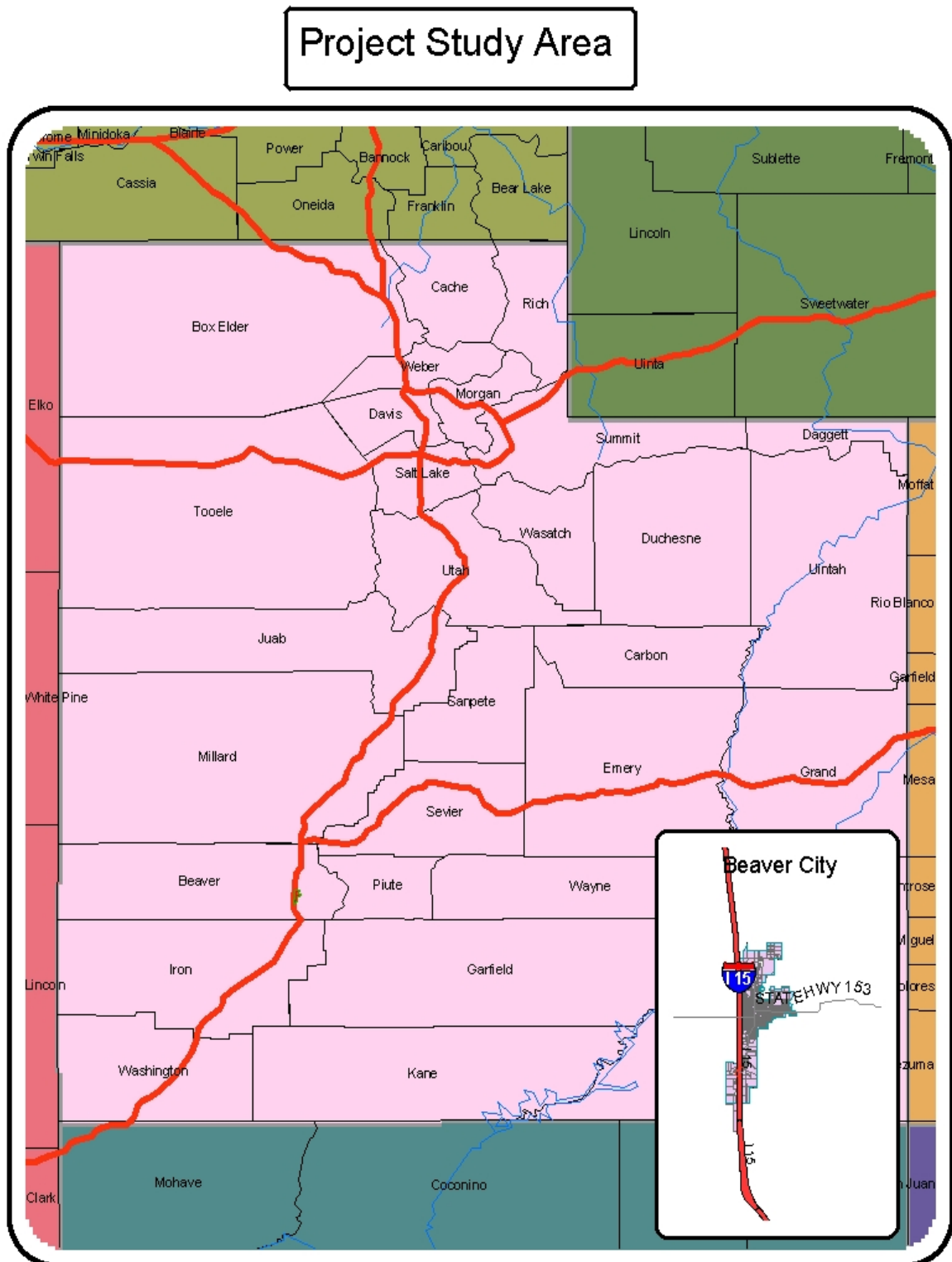
Five-year improvements focus on specific projects to improve deficiencies in the existing transportation system. The Thirty-year plan will identify those projects that require significant advance planning and funding to implement and are needed to accommodate future traffic demand within the study area.

1.4 Study Area

The study area includes Beaver City and land immediately adjacent to it that is in the County. A general location map is shown in Figure 1. The study area was developed by Beaver City and approved by the Beaver City Transportation Master Plan Technical Advisory Committee.

The roadway network within the study area includes I-15, SR-21, SR-153 and SR-160. Each of these roads provides the vital function of connecting Beaver City to the rest of Beaver County and the State. I-15 is the largest north/south link from Beaver City to places such as St. George and Salt Lake City. SR-21 and SR-153 provide links to many of the other parts of Beaver County for traffic movement and freight movement for the county. SR-160 is Beaver City's Main Street and acts as a business loop for the city from I-15. The remaining roads within the study area are comprised of city streets and county roads. Of major concern is how the local roads in the area develop. Issues of access, corridor preservation, and road design, are of major import and a plan for the future is developed.

Figure 1



1.5 Study Process

The study, which began in September 2003, is being administered and financed by UDOT Planning and a 21st Century Community Grant. It is being conducted under the guidance of the Planning, Zoning, and City Officials, which will be referred to as the Technical Advisory Committee or “TAC” for this document, consisting of 12 members, listed below:

Wade Bradshaw	Mayor
Les Williams	City Council Member
Ron Bird	City Council Member
Kari Draper	City Council Member
Shane Erickson	City Council Member
Ronnie Roberts	Planning Commission Chairperson
Tony Fusco	Planning Commission
Kelly Bradshaw	Planning Commission
Gary Nielson	Planning Commission
Connie Fails	Planning Commission
Steve Atkin	City Manager, Zoning Admin. and Public Works Director
Tyler Hoskins	Carter Burgess, Traffic Engineer
Curt Hutchings	5 County AOG



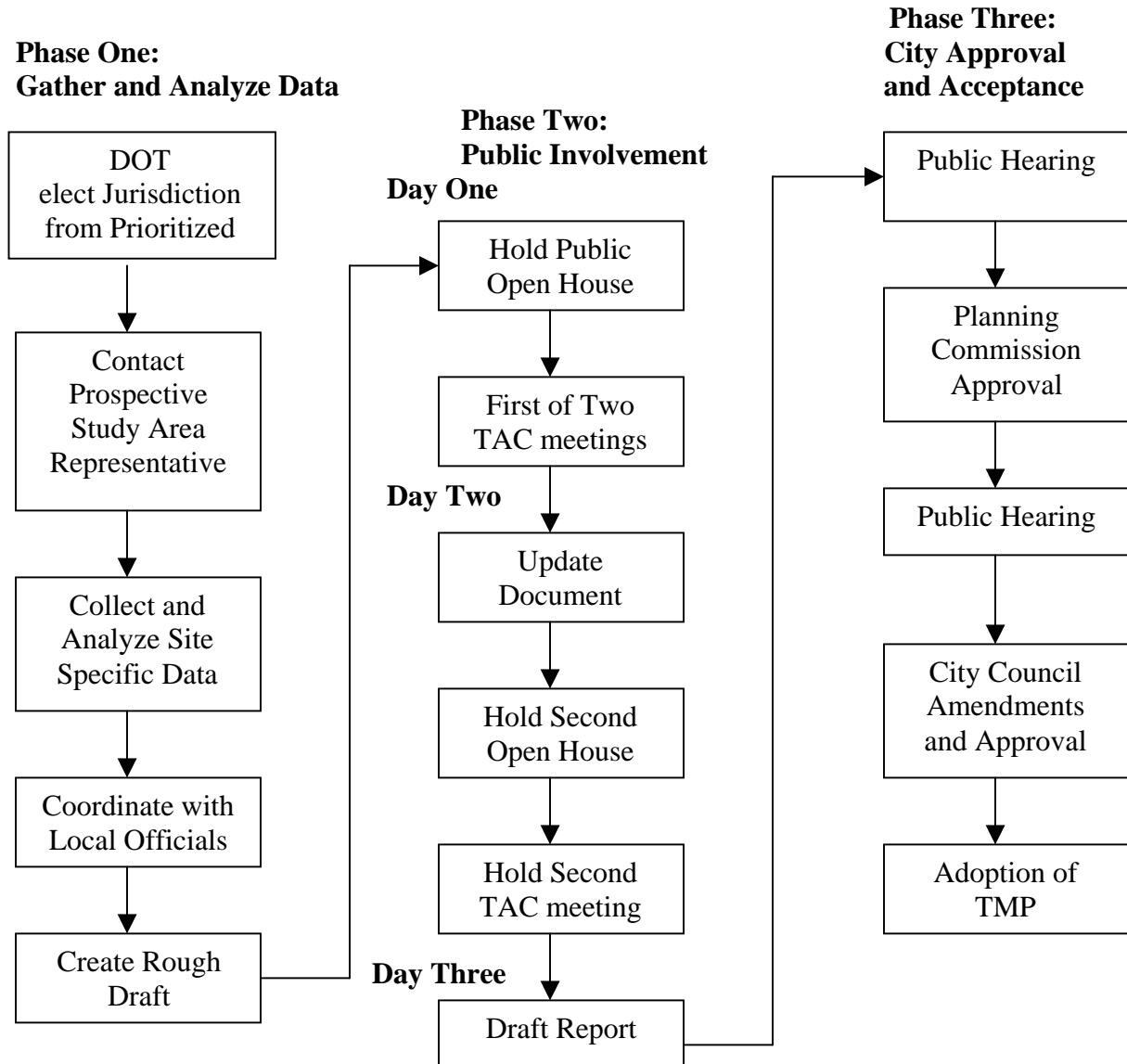
The Beaver City Technical Advisory Committee provides input to the Transportation Master Plan

The study process for the Beaver City Transportation Master Plan is depicted in Figure 2. The goal of this process is to identify the need, opportunities, and constraints for establishing and implementing the transportation plans. This process involves the participation of the TAC for guidance, review, evaluation and recommendations in developing the transportation plans.

The first component of the study process is to evaluate the existing and future traffic, infrastructure, population, and employment conditions. Evaluation of existing conditions provides a basis for the analysis of future conditions. Population and employment forecasts is developed for the short term and long term horizon. The location and concept of projects is developed during this component. The second component of the study process is to obtain input from the public through a series of open house meetings. The public's comments are used to broaden the issues that are being analyzed and determine the priority of those issues. The third component of the study process is to present to and obtain approval from the planning commission and city council. The master plan is then adopted.

The TAC will evaluate each part of the study process. Their comments will be incorporated into the study's draft final report. The remainder of the draft final report will focus on the recommendation and implementation portion of the transportation plan program. Transportation projects that will be recommended for the short-term and long-range needs will be developed based on the TAC's recommendations and concurrence.

Figure 2. Study Flow Chart



The study process allows for the solicitation of input from the public at two public workshops and two public meetings. This public participation element is included in the study process to ensure that any decisions made regarding this study are acceptable to the community. In addition, the Planning Commission and the City Council will both hold Public Hearings to take input on the plan before it is adopted by the City Council.

The public participation portion of this study is planned to occur at two stages during the development of the draft report. The first public workshop will be conducted after the inventory and analysis of existing conditions is performed and preliminary transportation improvements identified. The second public workshop will be conducted after the future conditions have been analyzed and transportation plans and implementation schedules have been developed.

Comments on issues received from the two public workshops will be recorded and discussed with the TAC. The TAC is expected to recommend those comments that are to be incorporated into the report and applicable to the goals of this study. The draft report will be submitted to the TAC for approval.

Upon TAC approval of the draft report, it will be submitted to the Planning Commission for review and recommendation to the Mayor and City Council of Beaver City for final adoption. The final report will describe the study process, findings and conclusions, and will document the analysis of the recommended transportation system projects and improvements.



The Interchange Beautification projects are two of Beaver City's top priorities

2 Existing Conditions

An inventory and evaluation of existing conditions within the study area was conducted so that existing transportation problems could be identified and a framework for the analysis of future conditions could be accomplished. The results of the investigation follow.

2.1 Land Use

In order to analyze and forecast traffic volumes, it is essential to understand the land use patterns within the study area. The city land use is described in the following paragraphs. Beaver's residential area is largely in one area, with some new spotty development in out-lying areas. Primary roads servicing the residential areas are SR-21 (Center Street west of Main Street), SR-153 (200 North or Tenth Street east of Main Street), and SR-160 (Main Street). There are approximately 40 miles of local roads, most servicing residential areas.

Beaver City has adopted a Zoning Map as of October 2002. The Zoning Map identifies likely land use types in the City. The future land use map is attached.

Commercial areas are served by SR-21, SR-160, and I-15. Recent commercial development is tending to be around the I-15 exits.

Beaver City has an industrial park accessed from the I-15 exit 109. This Industrial Park has had some development occur in the past two years.



Widening the north part of Main Street could improve traffic flow in the area.

Fishlake National Forest and BML lands are accessed by SR-153. A city golf course is also located off of SR-153. Most other public facilities are accessed by SR-160 (Main Street) and local roads. Great Basin National Park is access by SR-21 going west of Beaver City.

2.2 Environmental

In Utah there are a variety of local environmental issues. Each of the cities and counties need to look at what are the environmental issues in their areas on a case-by-case issue. There are many resources that can help local entities to determine what issues need to be addressed and how any problems that may exist can be resolved.

Some of the environmental concerns around the State are wetlands, endangered species, archeological sites, and geological sites among other issues. Environmental concerns should be addressed when looking at an area for any type of improvement to the transportation system. Specific issues for Beaver City will not be discussed here, as they are more related to specific projects as they are built.

2.3 Socio-Economic (Census Brief: Cities and Counties of Utah, May 2001)

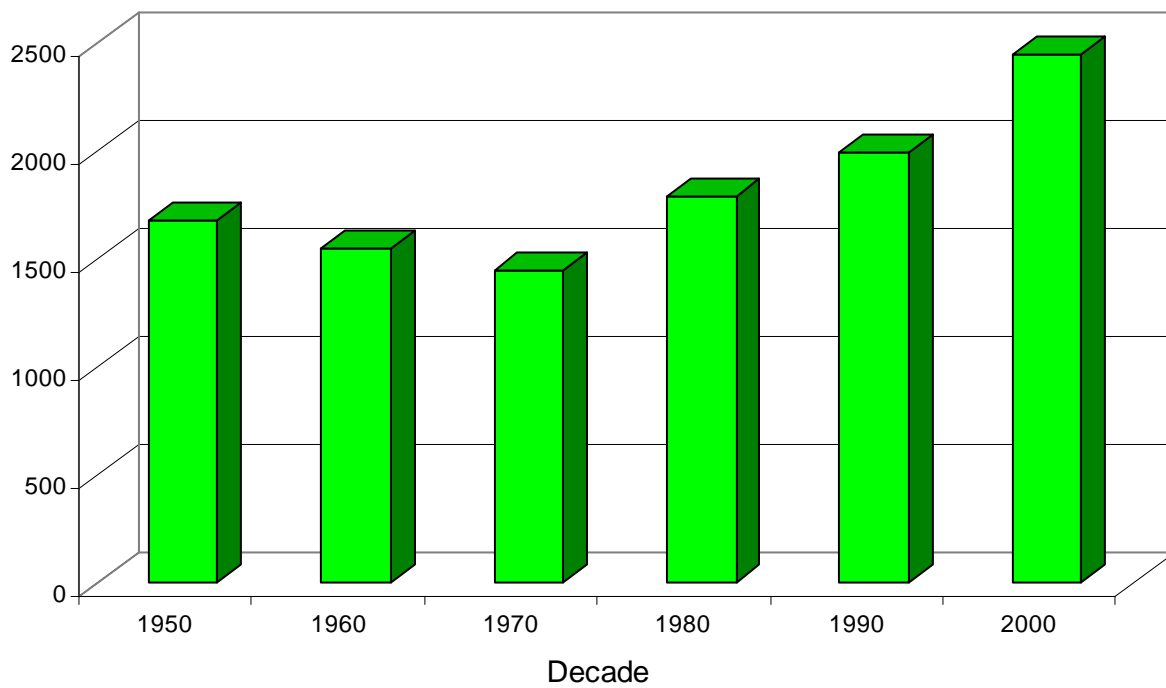
Beaver ranks 90th for population in the State of Utah, out of 235 incorporated cities and towns. Historical growth rates have been identified for this study, because past growth is usually a good indicator of what might occur in the future. Figure 3 identifies the population growth over the past 40 years for the State of Utah, Beaver County and Beaver City. The figure identifies that population in Beaver City has ranged from minus 12% in one decade to gaining 26% in the last full decade, while growth in the State has gained between 18 and 38 percent during the past 40 years.

Figure 3. Population Data

Population

Year	State of Utah	Beaver County	Beaver City
1950	688,862	4,856	1,685
1960	890,627	4,331	1,548
1970	1,059,273	3,800	1,453
1980	1,461,037	4,378	1,792
1990	1,722,850	4,765	1,998
2000	2,233,169	6,006	2,454

Beaver City Population



Source: U.S. Bureau of the Census

<http://www.governor.utah.gov/dea/OtherPublications.html>

Figure 6 identifies population growth rates for the State of Utah and Beaver County on a decennial basis from 1950 to 2000. Though the State population has grown every decade from 1950 until 2000, Beaver County had two decades in a row of sharp declines in population. Yet, from 1970 until 2000, Beaver County has almost doubled in population.

Beaver City has some unique demographic characteristics when compared with the State, particularly with age demographics. In the 18 to 29 year category, the State is at 22.2%, the County is at 15.5% and the City is at 15.6%. For the 65+-age category, the State is at 8.5%, the County is at 13.9% and the City is at almost 15%. The State's median age is 27.1 years and the County's median age is 30.8 years. The race demographics show a trend that is different from the state as well. The State has a smaller Non-Hispanic White population percentage, 85.3%, compared to the County, 91.4%. Beaver County is more typical of the more rural parts of the State, which tends to have a smaller minority population.



As Beaver City continues to grow, traffic congestion becomes more of an issue.

The 2000 median income in Beaver City is \$33,648, compared to the State median household income of \$45,726.

The unemployment rate in Beaver County was 1.3 percent in 2000. Beaver has had wider fluctuations than the State, but the average is about even with State growth. According to the Utah Department of Employment Security (UDES), in 2000 there were approximately 1110 employees working in Beaver City, which is 43.4 percent of Beaver County's total labor force.

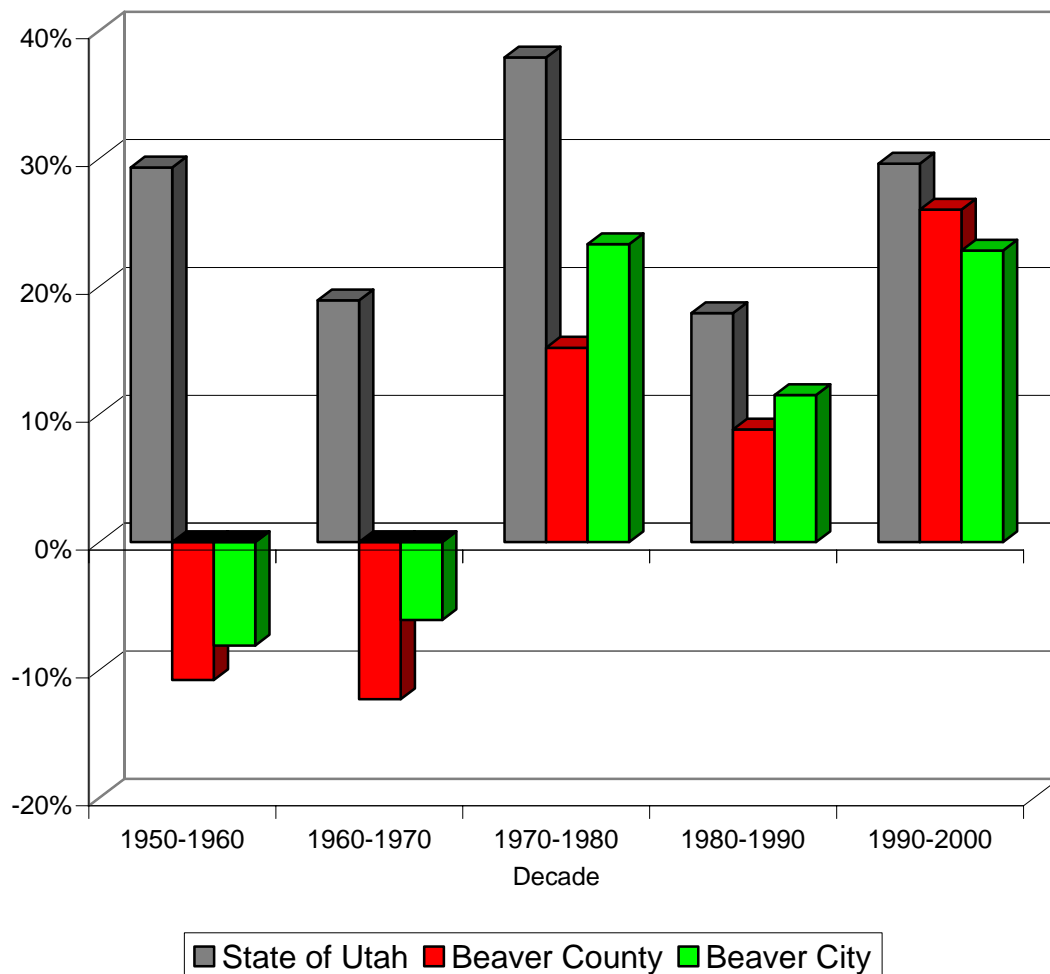
The majority of employees in Beaver County work in four primary employment sectors: Government Industries, Trade, Services and Transportation, Construction, Public Utilities (TCPU), as shown in Figure 4. In the county, these four sectors make up 85.94 percent of the labor force.

Figure 4. Population Change Data

Decennial Population Change

Decade	State of Utah	Beaver County	Beaver City
1950-1960	29.3%	-10.8%	-8.1%
1960-1970	18.9%	-12.3%	-6.1%
1970-1980	37.9%	15.2%	23.3%
1980-1990	17.9%	8.8%	11.5%
1990-2000	29.6%	26.0%	22.8%

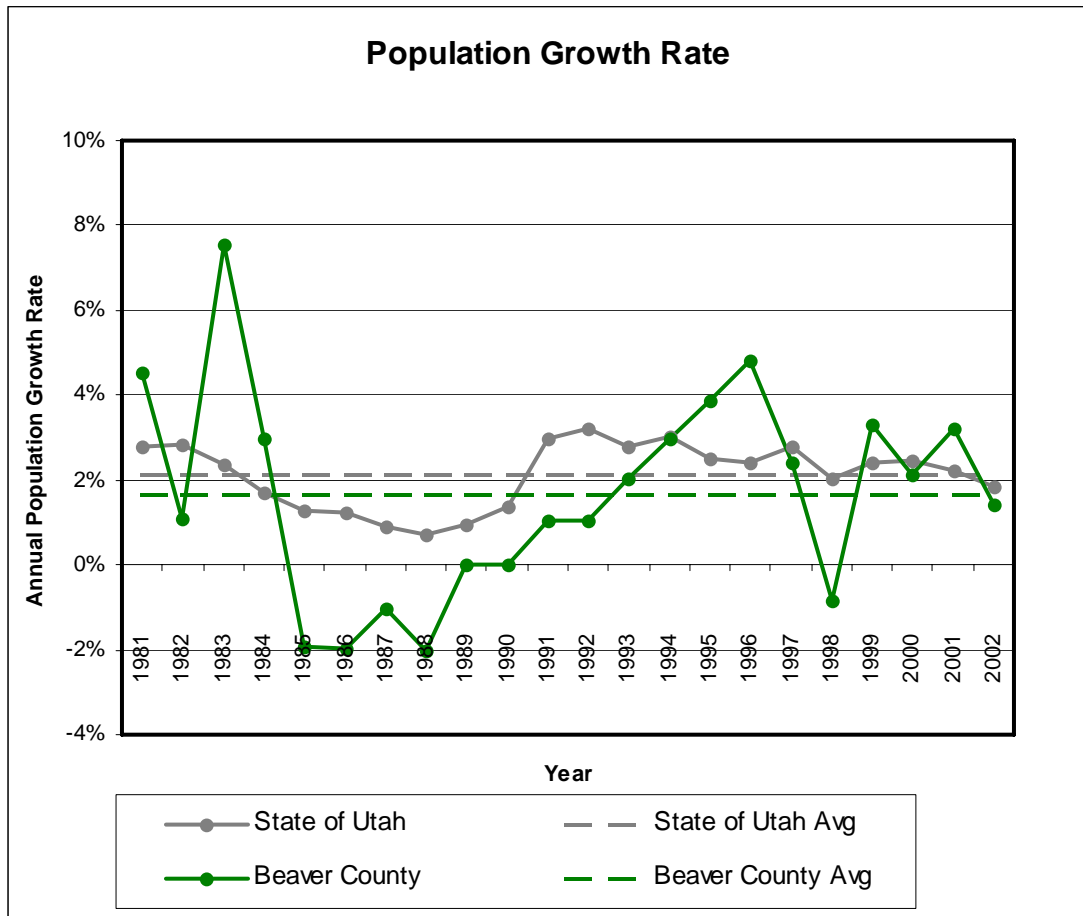
Decennial Population Change



Source Data: U.S. Bureau of the Census

<http://www.governor.utah./dea/OtherPublications.html>

Figure 5. Population Growth Rate (1980-2000)



Source: Governors Office of Planning and Budget

<http://www.governor.utah.gov/dea>

Figure 6. Employment Growth Rate (1980-2000)
Source: Governors Office of Planning and Budget
<http://www.governor.utah.gov/dea>

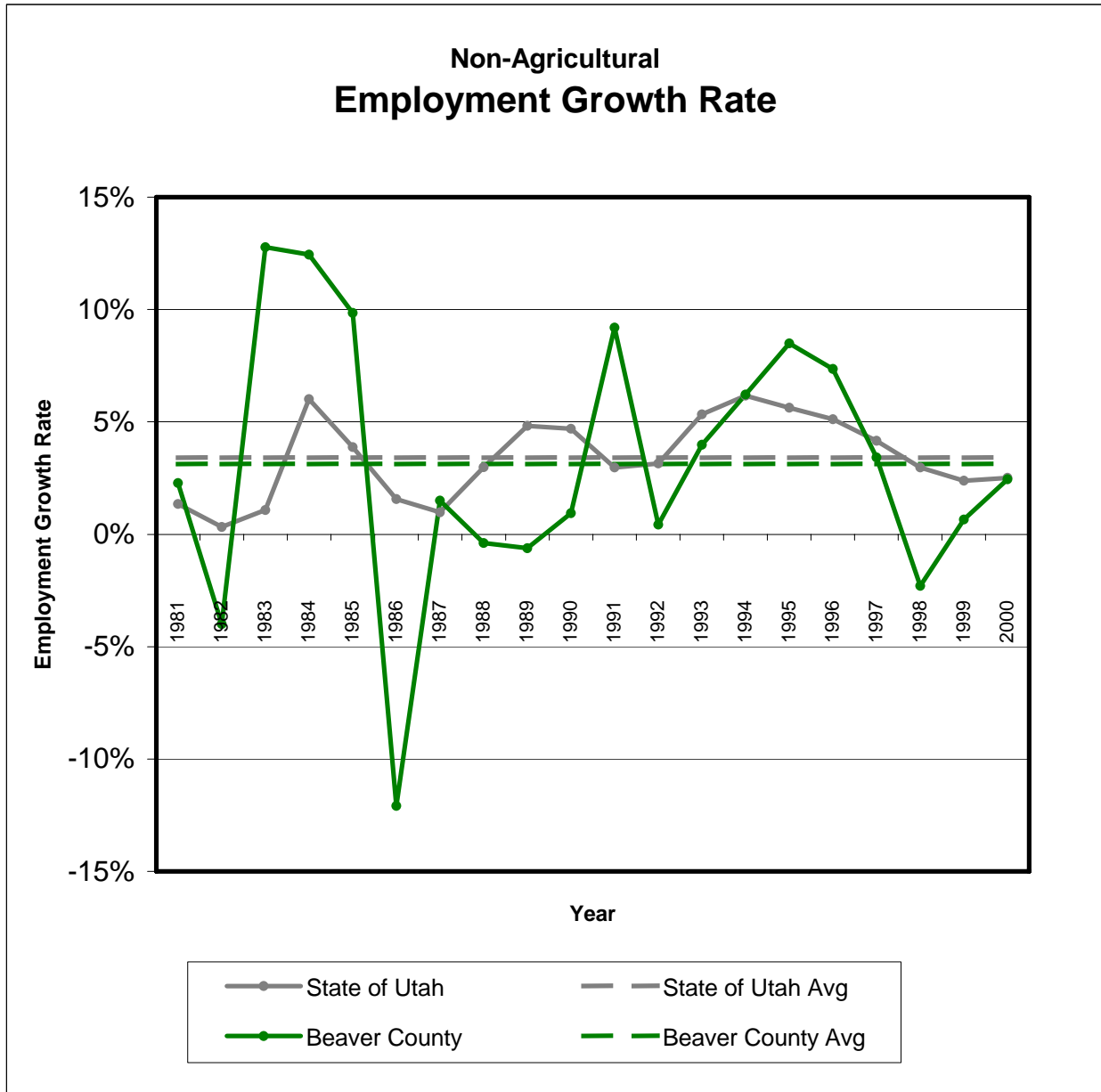
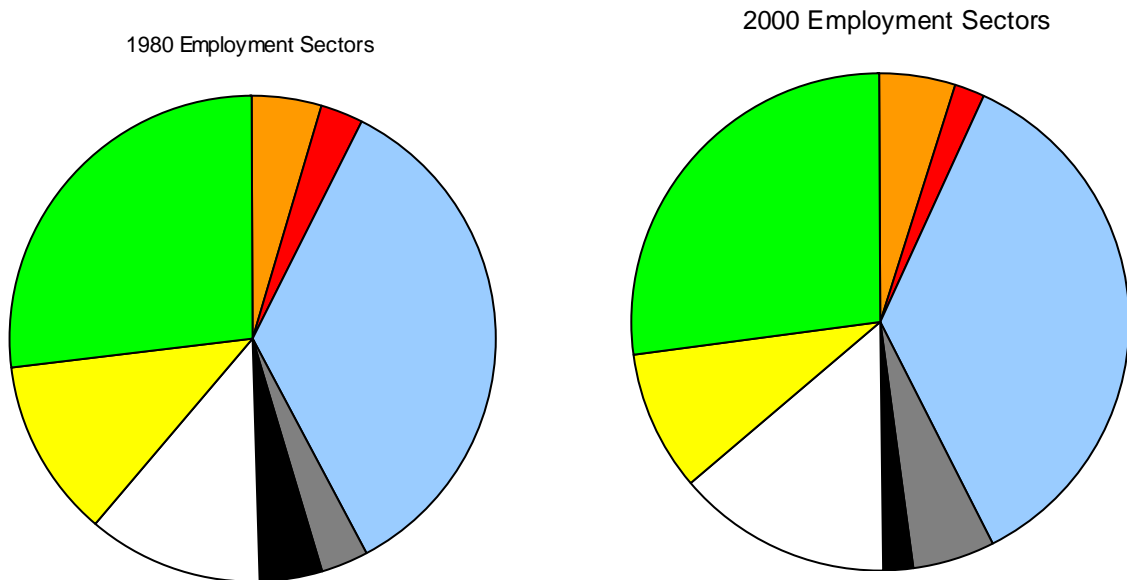


Figure 7. Employment Sectors (1980-2000)

	Sector	1980	2000
	Construction	4.85%	4.93%
	FIRE	2.76%	1.96%
	Government	34.70%	35.68%
	Manufacturing	2.95%	5.14%
	Mining	4.18%	2.01%
	Services	11.60%	13.89%
	TCPU	11.98%	9.28%
	Trade	27.00%	27.09%

Source: Governors Office of Planning and Budget
<http://www.governor.utah.gov/dea/HistoricalData.html>



2.4 Bridges

There are eight bridges located in the study area which important components of the study area's roadway network, helping to increase network continuity through physical barriers. Figure 10 identifies the location of these structures with their sufficiency rating. The sufficiency rating utilized by UDOT is a method of evaluating data that includes structural adequacy, serviceability, and need for public use. The result of this rating procedure is a score in which 100 represents an entirely sufficient bridge and zero represents an entirely insufficient or deficient bridge.

2.4.1 Bridge Sufficiency Ratings

Table 1 compares the bridges in the study area and identifies their sufficiency rating and location.

Table 1. Bridges

Number	Location	Maximum Span	No. Lanes & Road Width	Sidewalk	Sufficiency Rating
0D 733	0.8 miles n. of north Beaver interchange	70 ft	2 lanes 24 ft	No	79.2
0E 1785	@ north Beaver Interchange	10 ft	6 lanes not recorded	No	69.3
1D 767	West of Beaver	40 ft	2 lanes 38 ft	No	94.7
0C 571					
0C 572					
0D 285					
001002F1	Beaver River				
001005F1	Beaver River				

Source: Utah Department of Transportation/Structures Division

These eight bridges are essential links to cross I-15 over the north wash, I-15 over SR-160 at the north Beaver Interchange, and I-15 over SR-21, I-15 over SR-160 at the south interchange and other roads over the Beaver River. The impacts of the bridges on the transportation system are very important to the safe and efficient movement of vehicles. Growing residential developments depend on these bridges for their access.

2.5 Traffic Counts

Recent average daily traffic count data were obtained from UDOT. Table 2 shows the traffic count data on the key roadways of the study area. The number of vehicles in both directions that pass over a given segment of roadway in a 24-hour period is referred to as the average daily traffic (ADT) for that segment.

Table 2. Average Daily Traffic

Road	Segment	Year	Total ADT
I-15	Beaver Milford Interchange to South INCL Beaver	2002	14,288
I-15	South INCL* Beaver to Beaver Manderfield Interchange	2002	14,288
I-15	Beaver Manderfield Interchange to Manderfield Interchange	2002	15,695
SR-21	SR-310 Minersville State Park to West INCL Beaver	2002	1,385
SR-21	West INCL Beaver to SR-160	2002	3,785
SR-153	SR-160 to East INCL Beaver	2002	4,415
SR-153	East INCL Beaver to Fishlake National Forest	2002	2,310
SR-160 (Main St.)	South INCL Beaver to SR-21	2002	7,990
SR-160 (Main St.)	SR-21 to SR-153	2002	8,025
SR-160 (Main St.)	SR-153 to Local Road to Manderfield	2002	6,610
SR-160 (Main St.)	Local Road to Manderfield to North INCL Beaver	2002	4,865

Source: Utah Department of Transportation

**INCL=Incorporated City Limits*

UDOT maintains 86 continuously operated automatic traffic recorders (ATR) throughout the state highway system. ATRs collect data continuously throughout the year in order to determine monthly, weekly, daily, and hourly traffic patterns. Two ATR's are located in the study area. One of the ATR's is located approximately 10 miles west of the Beaver City limits on SR-21. This ATR measures the traffic coming to and from the west part of the county. Figure 11 depicts the daily and monthly variations in traffic volumes at this location. The following points summarize the 2002 data from the ATR at this location.

Traffic on SR-21

- October was the highest volume month, 16.4% higher than the average
- January was the lowest volume month, 15.3% lower than the average
- The highest daily volumes occurred on Fridays, 10.2% higher than the average
- The lowest daily volumes occurred on Sundays, 17.6% lower than the average



The intersection of Main and Center is a priority for a traffic signal analysis by UDOT for Beaver City.

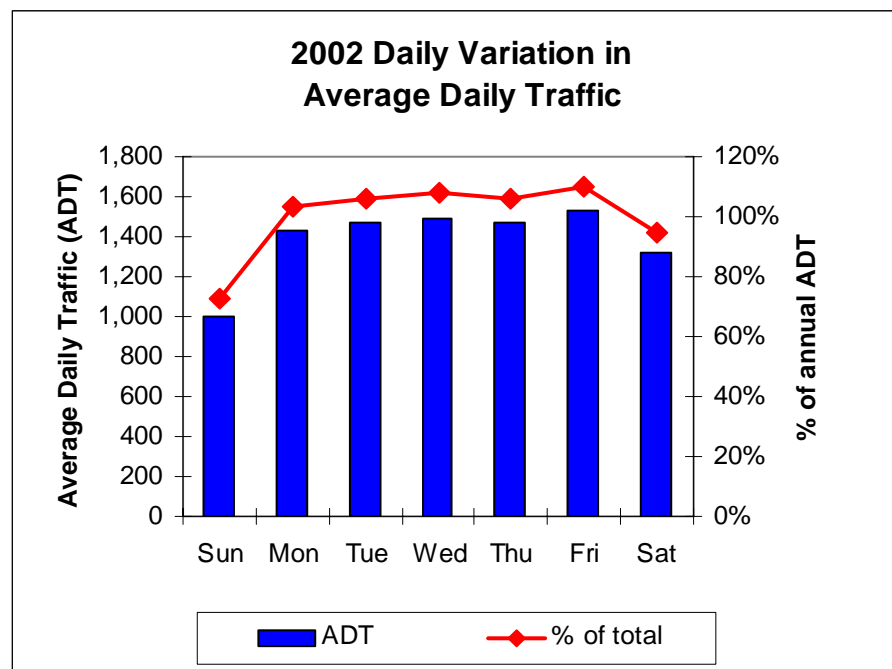
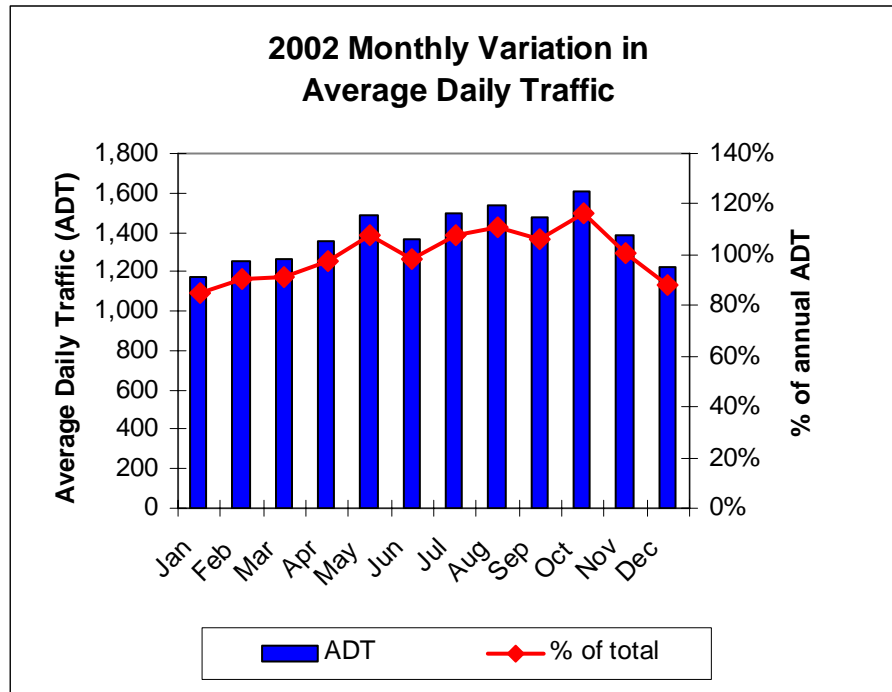
The peaks that occur on SR-21 during the year coincide with planting and harvesting seasons, with May being the second highest monthly peak. The lowest peaks occur during months when little farm traffic would be on the road and the main traffic would be commuter and freight traffic. The average hourly peaks show that the traffic has a classic commuter quality. The peaks occur during the morning and then again during the afternoon. Most of the traffic on the road occurs during the weekdays as opposed to the weekends, supporting the fact that most of the commute and most freight deliveries are during the weekdays.

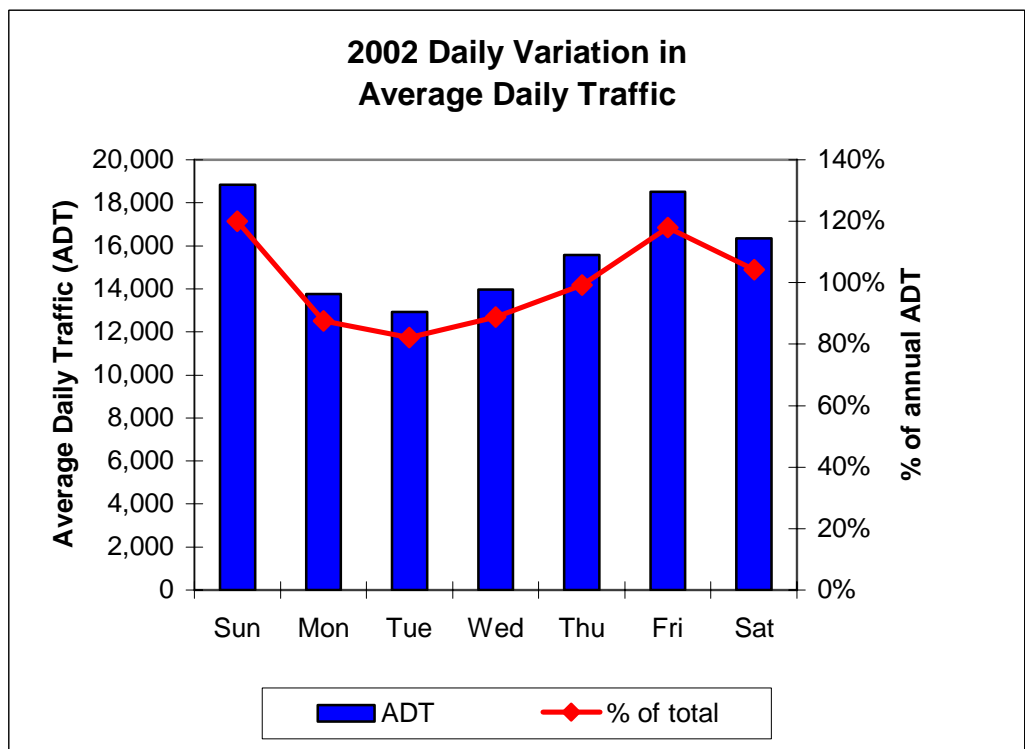
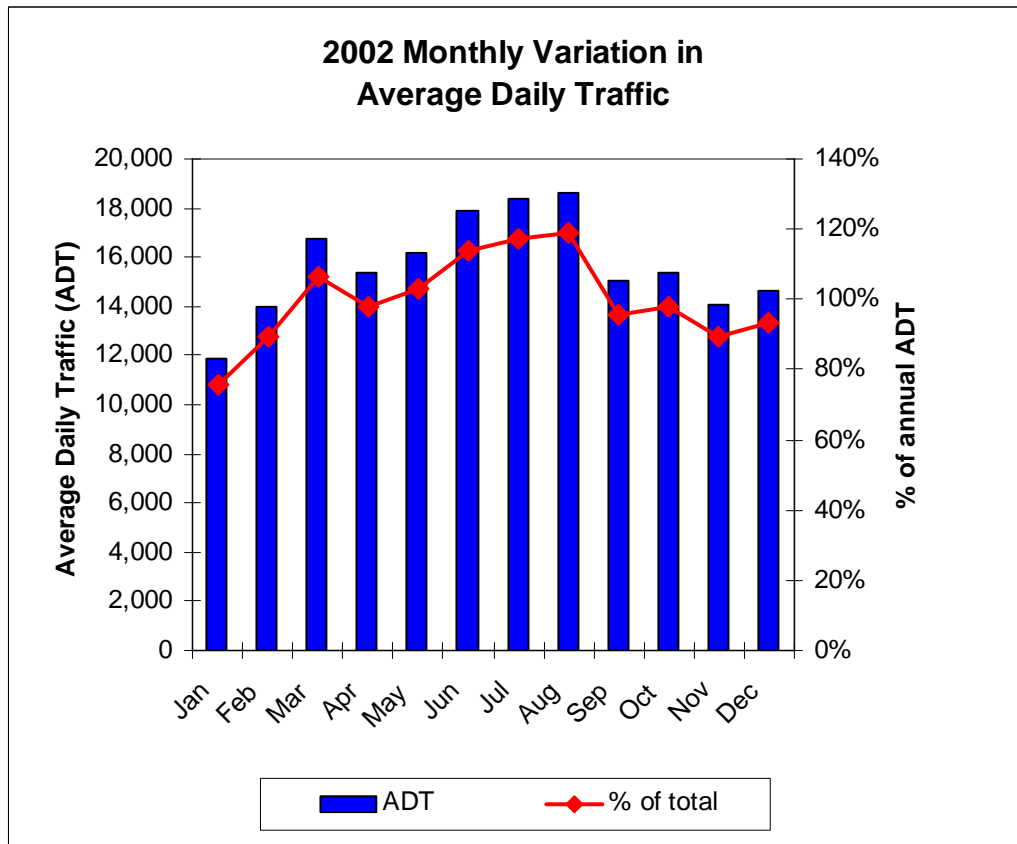
The second ATR is on I-15 at the north Beaver City interchange. This ATR counts traffic moving north and south at the north end of Beaver. It would not measure traffic that exits the freeway into Beaver, or traffic that enters the freeway from Beaver.

Traffic on I-15

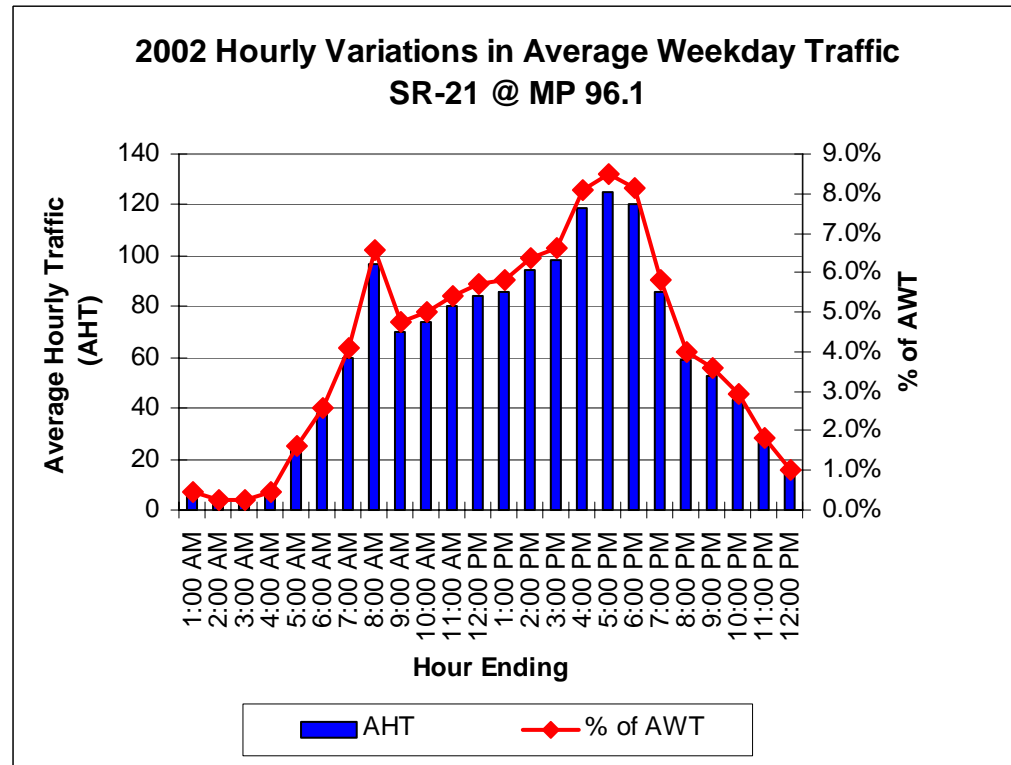
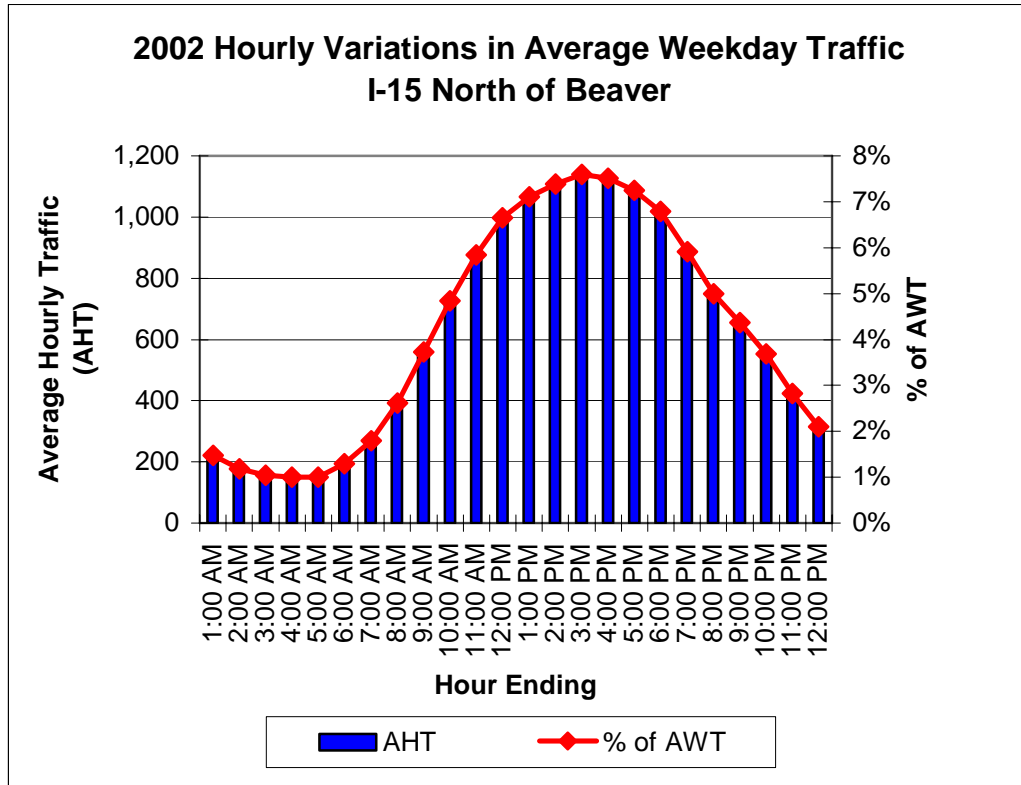
- August was the highest volume month, 18.8% higher than the average
- January was the lowest volume month, 24.3% lower than the average
- The highest daily volumes occurred on Sundays, 20% higher than the average
- The lowest daily volumes occurred on Tuesdays, 17.7% lower than the average

The traffic count on I-15 shows a more seasonal variation. Most of the traffic occurs during the summer months, indicating recreation traffic, especially the month of August. Spring Break participants traveling through the area are thought to contribute to the single spike that occurs in March. The hourly and daily variations support the idea that motorists are traveling to places such as Nevada and California. Most of the traffic passes through the Beaver area between 1:00 pm and 5:00 pm in the afternoon. The daily variations show the largest spikes on Sunday and Friday, suggesting weekend travel between Nevada and Salt Lake City.





Source: Utah Department of Transportation
Figure 13. Hourly Variations Traffic



2.6 Traffic Accidents

Traffic accident data was obtained from UDOT's database of reported accidents from 2000 through 2002. Over 29 miles of roadway were analyzed to determine if they warrant further investigation.

Table 3 summarizes the accident statistics for those segments for a three-year period from 2000 through 2002. Additional information includes the average daily traffic, the number of reported accidents, and the accident rates. The roadway segment accident rates were



Sidewalk continuity in the city and trails around the city are identified as important needs.

determined in terms of accidents per million vehicle miles traveled. Accident rates at the intersections were not calculated due to the lack of traffic volume data on the side streets.

The results show that two segments of SR-160 have higher crash rates than what is expected for this type of facility when compared to other similar facilities across the state. The segment from milepost 1.35 to

milepost 2.02 is the segment 1.35 miles north of the south interchange and continues to milepost 2.02.

There are some curves in this section that might be improved with increased warning signs and lighting. The segment from milepost 2.21 to milepost 3.02 is from the intersection of Main Street (SR-160) and 200 North (SR-153) to the Manderfield Highway. It is likely that these accidents are a result of collisions between the through movement vehicles and vehicles turning into and pulling out of driveways along Main Street. Further study of the cause of the accidents along these two segments needs to be conducted.

Table 3. Crash Data 2000-2002

Road	From Milepost	End Milepost	ADT (2002)	# Crashes (2000-2002)	Crash Rate	
					Actual	Expected*
I-15	108.93	111.90	14,288	27	0.82	1.04
I-15	111.90	111.98	14,288	1	0.01	0.81
I-15	111.98	120.28	15,695	98	0.94	1.04
SR-21	96.12	106.79	1,385	28	2.06	2.35
SR-21	106.79	107.27	3,785	2	1.31	1.95
SR-153	0.00	1.11	4,415	7	1.43	2.27
SR-153	1.11	4.53	2,310	11	1.42	2.59

SR-160 (Main St.)	1.35	2.02	7,990	9	2.38	1.97
SR-160 (Main St.)	2.02	2.21	8,025	2	1.41	1.97
SR-160 (Main St.)	2.21	3.02	6,610	14	3.51	1.97
SR-160 (Main St.)	3.02	3.62	4,865	4	1.74	1.95

* Statewide average accident rates for functional class and volume group.

2.7 Bicycle and Pedestrian

Beaver and Beaver County are currently working on developing a bicycle and trails master plan that identifies the location and types of facilities that they want to implement. This activity is coordinated with future roadway improvements and other development activities.

Sidewalks in Beaver are consistent in the central business district area and school routes, with fewer sidewalks available in residential areas.

Beaver City and County are currently working on plans and grant applications to develop bike and walking routes. Several miles of new trails, accessing the city, foothills and into Fishlake National Forest are planned.

2.8 Public Transportation

Beaver does not have a fixed route bus system. Regional bus service is provided by Greyhound. Greyhound stops at the El Bambi restaurant five times a day, seven days a week. Service is provided to Los Angeles, Las Vegas, Salt Lake City and Denver.

The Senior Center operates two Paratransit Vans for the senior citizens to shop, visit the doctor and other essential trips.

If Beaver wanted to pursue fixed route transit service, the Utah State Enabling Act allows for cities or counties to organize transit districts. Once a transit district has been established the city or county can attempt to secure funding to provide transit service or they can vote to be annexed by Utah Transit Authority (UTA). If the people in the city or county elect to be annexed by UTA, a one-quarter percent sales tax is initiated in those communities that receive the transit services.



Milford yard has the potential to become an intermodal facility for Union Pacific

2.9 Freight

Aside from modest levels of truck traffic on SR-21, and larger numbers on I-15, freight transportation is not at present a major issue in Beaver.

However, owing to its location mid-way between Salt Lake City and Las Vegas, as well as its close proximity to the Union Pacific Railroad terminal in Milford, freight is likely to play a larger role in Beaver's future.

Beaver County is currently investigating the development of a rail/truck intermodal freight facility adjacent to the UP freight yard in Milford. This project would be in conjunction with the Beaver City's effort to locate logistics-oriented businesses in the town's industrial park located near exit 109 on I-15. The Milford intermodal terminal would also provide regional service by highway to Cedar City, the St. George area, and Las Vegas. The transportation system impact of this project on Beaver will be increased truck traffic on SR-21 connecting to I-15.

2.10 Revenue

Maintenance of the existing transportation facilities and construction of new facilities come primarily from revenue sources that include the Beaver City general fund, federal funds, transportation impact fees and State Class C funds.

Financing for local transportation projects consists of a combination of federal, state, and local revenues. However, this total is not entirely available for transportation improvement projects, since annual operating and maintenance costs must be deducted from the total revenue. In addition, the City is limited in their ability to subsidize the transportation budget from general fund revenues.

2.10.1 State Class B and C Program

The distribution of Class B and C Program monies is established by state legislation and is administered by the State Department of Transportation. Revenues for the program are derived from State fuel taxes, registration fees, driver license fees, inspection fees, and transportation permits. Seventy-five percent of the funds derived from the taxes and fees are kept by the Utah Department of Transportation for their construction and maintenance programs. The remaining twenty-five percent is made available to counties and cities.

Class B and C funds are allocated to each city and county by a formula based on population, road mileage, and land area. Class B funds are given to counties, and Class C funds are given to cities and towns. The table below identifies the method used to allocated B and C funds.

Apportionment Method of Class B and C Funds

Based on	Of
50%	Roadway Mileage
50%	Total Population

Class B and C funds can be used for maintenance and construction of highways, however thirty percent of the funds must be used for construction or maintenance projects that exceed \$40,000. Class B and C funds can also be used for matching federal funds or to pay the principal, interest, premiums, and reserves for issued bonds.

2.10.2 Federal Funds

There are federal monies that are available to cities and counties through the federal-aid program. The funds are administered by the Utah Department of Transportation. In order to be eligible, a project must be listed on the five-year Statewide Transportation Improvement Program (STIP).

The Surface Transportation Program (STP) provides funding for any road that is functionally classified as a collector street or higher. STP funds can be used for a range of projects including rehabilitation and new construction. Fifty percent of the STP funds are allocated to urban and rural areas of the state based on population. Thirty percent can be used in any area of the State, at the discretion of the State Transportation Commission. The remaining twenty percent must be spent on highway safety projects and transportation enhancements. Transportation enhancements include 10 categories ranging from historic preservation, bicycle and pedestrian facilities, and water runoff mitigation.

The amount of money available for projects specifically in the study area varies each year depending on the planned projects in UDOT's Region Four. As a result, federal aid program monies are not listed as part of the study area's transportation revenue.

2.10.3 Local Funds

Beaver City, like most cities, has utilized general fund revenues in its transportation program. Other options available to improve the City's transportation facilities could involve some type of bonding arrangement, either through the creation of a redevelopment district or a special improvement district. These districts are organized for the purpose of funding a single, specific project that benefits and identifiable group of properties. Another source is through general obligation bonding arrangements for projects felt to be beneficial to the entire entity issuing the bonds.

2.10.4 Private Sources

Private interests often provide sources of funding for transportation improvements. Developers construct the local streets within the subdivisions and often dedicate right-of-way and participate in the construction of collector or arterial streets adjacent to their developments. Developers can also be considered as a possible source of funds for projects because of the impacts of the development, such as the need for traffic signals or street widening.

3 Future Conditions

3.1 Land Use and Growth

Beaver's Transportation Master Plan must be responsive to current and future needs of the area. The area's growth must be estimated and incorporated into the evaluation and analysis of future transportation needs. This is done by:

- Forecasting future population, employment, and land use;
- Projecting traffic demand;
- Forecasting roadway travel volumes;

- Evaluating transportation system impacts;
- Documenting transportation system needs; and
- Identifying improvements to meet those needs.

This chapter summarizes the population, employment, and land use projections developed for the project study area. Future traffic volumes for the major roadway segments are based on projections utilizing 20 years of traffic count history. The forecasted traffic data are then used to identify future deficiencies in the transportation system.

3.2 Population and Employment Forecasts

The Governor's Office of Planning and Budget develop population and employment projections. The current population and employment levels, as well as the future projections for each are shown for Beaver City and County in the following table.

Population and Employment

Year	City	County	
	Population	Population	Employment
2000	2,493	6,006	3,188
2030	4,006	9,653	4,710

3.3 Future Land Use

New residential growth is occurring in the northeast quadrant of the City, continued commercial growth around the interchanges with Interstate 15, and continued development of the industrial park in the southwest quadrant of the City. The future land use map is attached.

3.4 Traffic Forecast

The Utah Department of Transportation has recently completed a Long Range Plan for the state highways. As part of the Long Range Plan, UDOT developed traffic forecasts for the 6000 miles of state highways.



Planning and Zoning provide input on future land use.

Traffic forecasts in the rural areas of Utah are based on historic traffic volumes from the previous 20 years, with a straight-line forecast to estimate future traffic volumes. The forecasts are then inserted into the database for analysis and display. The forecast numbers are for the years 2010, 2020, and 2030. These show a steady increase in traffic for all of the roadways in the study area.

In Beaver City, traffic volumes have increased between 2% to 3% a year, with population growing at similar rates. Based on future traffic

projections from UDOT, there are several roadways in the city that will need to be improved to handle future traffic capacity. Those roadways and projects are listed in section 3.

4 Street Designation

4.1 Functional Street Classification

This section identifies the current and future function and operational characteristics of the roadway network of Beaver City. Functional street classification is a subjective means to identify how a roadway functions and operates when a combination of the roadway's characteristics are evaluated. These characteristics include; roadway configuration, right-of-way, traffic volume, carrying capacity, property access, speed limit, roadway spacing, and length of trips using the roadway.

Six primary classifications were used in classifying selected roadways in Beaver. These classifications are: Major Arterial, Minor Arterial, Major Collector, Minor Collector, Residential Local, and Residential Rural. Arterials provide a higher degree of traffic mobility with limited property access and often connect to the freeway system. Collectors provide a balance between mobility and property access trips. Local streets and roads serve property access based trips and these trips are generally shorter in length. Traffic from the local roads is gathered on to the collector system and channeled to the arterials.



The only freeway that runs through Beaver City is I-15, running north/south. SR-160 or Main Street, the major route in town that connects the north and south interchanges, is classified as a Major Arterial. SR-153, which takes traffic to the Fishlake National Forest and US-89 in Piute County, is functionally classified as a Minor Arterial. SR-21, which brings traffic into the city from the west from Milford and Minersville, is functionally classified by UDOT as a Major Collector. There are several roads in the city that collect neighborhood traffic and distribute it to the higher classified roadways. These types of roads are classified as minor collectors and include 600 North, 1400 North, 1900 North, 400 East, North Creek Road, etc. The remaining roads are functionally classified as either residential local or residential rural. A map of the streets and their classifications is shown at the end of this section.

Traffic flow in this area will become more congested; widening will be necessary to ease that congestion.

The following pages are Beaver City's Master Street Plan that identifies functional classification of streets in the City. Included in this Plan are right-of-way widths, future

roadways, street side treatments and street cross sections. This Plan is discussed on the next several pages.

The design of the individual roadway elements depends on the intended use of the facility. Roads with higher design volumes and speeds need more travel lanes and wider right-of-way than low volume, low speed roads. The high use roadway type should include wider shoulders and medians, separate turn lanes, dedicated bicycle lanes, elimination of on street parking, and control of driveway access. For most roadways, an additional buffer area is provided beyond the curb line. This buffer area accommodates the sidewalk area, landscaping, and local utilities. Locating the utilities outside the traveled way minimizes traffic disruption in utility repairs or changes in service are needed.

The hierarchy of cross-sections provided for are residential (2 lanes), minor collector (2 lanes), major collector (2 lanes and a median), and minor and major arterial roadways (4 lanes and a median). It is not anticipated that the City will have jurisdiction over major arterials in the near future. Typical elements of the roadway cross sections are identified in the following sections. There are few dimensions used in street design that have been determined exactly by research. The cross-section generally represents a consensus of opinion based on operating experience.

- ***Residential Streets:*** Residential streets provide access to abutting land uses and service local traffic movement. Due to low traffic speeds and relatively small traffic volumes on the street, parking is usually allowed on the street and bicycles are allowed without a separate travel lane. The cross-section of a residential street includes 41-feet of right-of-way for a rural roadway and 55-feet of right-of-way for all others. This allows two 12-foot lanes, parking and/or shoulders, and a side treatment of 6.5 feet to 8.5 feet (6.5 foot side treatment includes a 2.5 foot curb and gutter and no sidewalk, 8.5 foot side treatment includes a 6 foot walk and a 2.5 foot curb and gutter or an optional side treatment of gravel).
- ***Minor Collectors:*** Collector streets provide for traffic movement between local streets and arterial streets and provide access to abutting land uses. The minor arterial is a two-lane section with 65-feet of right-of-way. The 65-feet allows for two 12-foot lanes, two 5-foot bicycle lanes, two 7-foot parking lanes, and two 8.5-foot buffers (each includes a 4-foot sidewalk, and a 2-foot landscaping and utility strip). The increased width of this type of roadway versus that of the local streets allows for the development of on-street bus stops or a separate right turn lane by eliminating the on-street parking near the intersection. Due to higher speeds and increased traffic volumes, bicyclists should be served by having a separate, dedicated travel lane. .
- ***Major Collectors:*** The three-lane, major collector includes a 65-69-foot roadway cross-section. This design allows for two 12-foot lanes, a 14-foot two-way left-turn lane, two 5-foot bicycle lanes, no parking, and either 8.5 or 10.5 side treatment for sidewalk, landscaping and utilities.
- ***Minor Arterials:*** Arterial streets provide major through traffic movement between geographic areas. These roadways typically have some form of access control

that limits the location of driveways. The minor arterial roadway includes either 93 or 97-foot roadway cross-section. This cross-section allows for a 14-foot center lane for left turns, four 12-foot travel lanes, two 7-foot parking and either 8.5-foot or 10.5-foot side treatments. Street Design

All streets shall be designed to conform to the Engineering standards and technical design requirements contained within the *Beaver City Engineering Standards*. The standards outlined in that document can be supplemented by this master plan AASHTO (American Association of State Highways Transportation Officials), *A Policy on Geometric Design of Highways and Streets*, MUTCD (Manual on Uniform Traffic Control Devices). In cases of conflict, a determination shall be made by the City Engineer, whose determinations shall be final.

Some of the basic elements of street design are outlined in this section. For the full text on Street Design issues, please refer to the *Beaver City Engineering Standards*.

4.2 Roadway Cross Sections

Cross sections are the combination of the individual design elements that constitute the design of the roadway. Cross section elements include the pavement surface for driving and parking lanes, curb and gutter, sidewalks and additional buffer/landscape areas. Right-of-way is the total land area needed to provide for the cross section elements.

The design of the individual roadway elements depends on the intended use of the facility. Roads with higher design volumes and speeds need more travel lanes and wider right-of-way than low volume, low speed roads. The high use roadway type should include wider shoulders and medians, separate turn lanes, dedicated bicycle lanes, elimination of on street parking, and control of driveway access. For most roadways, an additional buffer area is provided beyond the curb line. This buffer area accommodates the sidewalk area, landscaping, and local utilities. Locating the utilities outside the traveled way minimizes traffic disruption in utility repairs or changes in service are needed.

5 Existing City Streets

The original streets of Beaver City are designed about 100 feet in width. 200 West Street is about 120 feet wide. This width causes problems, as shown in this picture, with unfinished areas, that are full of weeds and un-kept in many instances. There is about 40 feet of shoulder on each side that is gravel and weeds. Many people have expressed the desire to have curb & gutter



Wide roads and unfinished sides are always an issue of discussion.

and sidewalks on these streets, which creates many issues that would have to be addressed, such as:

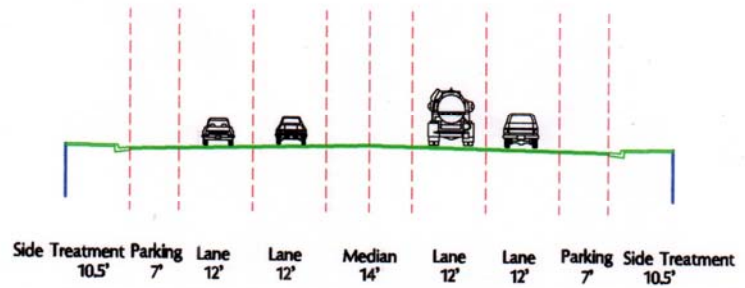
- What to do with the extra width, should the streets be narrowed?
- Where would the curb, gutter and sidewalk be placed?
- Who would pay for the improvements?
- Can the City afford to maintain the improvements after they are built?
- Do people want, and would they care for 16.5 feet of property if given to them?

Beaver City will explore ideas and options for the development of original City streets, including costs of, and feasibility of narrowing and development of the streets.

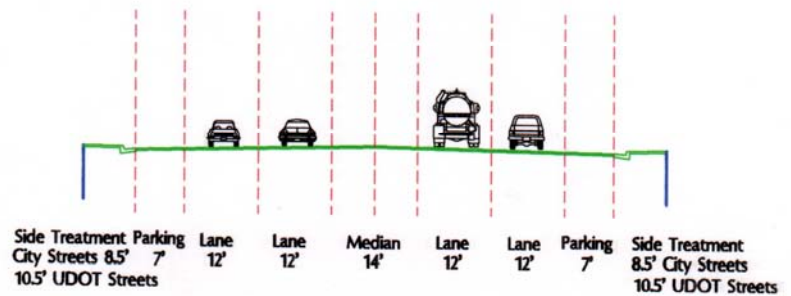
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Road Cross Sections

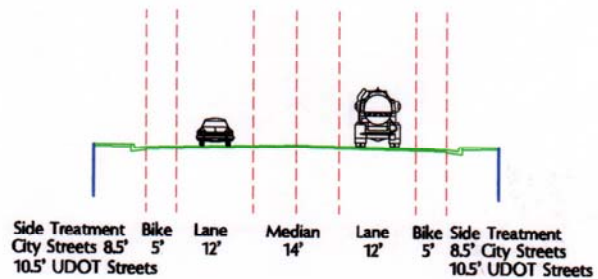
MAJOR ARTERIAL ROADWAY SECTION > 97' RIGHT OF WAY



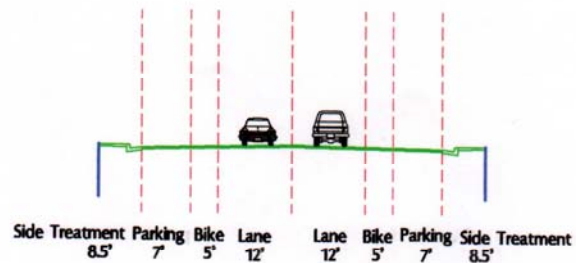
MINOR ARTERIAL ROADWAY SECTION 93'- 97' RIGHT OF WAY



MAJOR COLLECTOR ROADWAY SECTION 65'- 69' RIGHT OF WAY

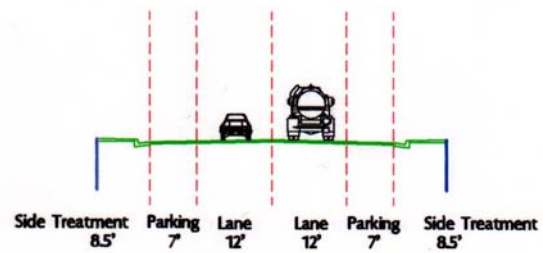


MINOR COLLECTOR ROADWAY SECTION 65' RIGHT OF WAY

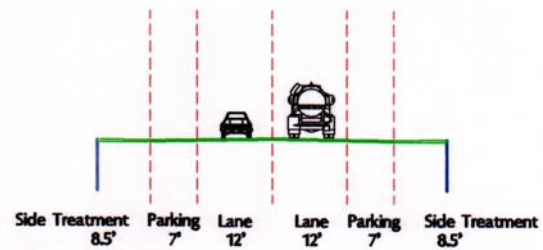


Road Cross Sections

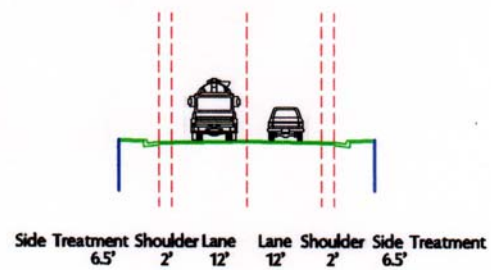
RESIDENTIAL STANDARD
ROADWAY SECTION
55' RIGHT OF WAY



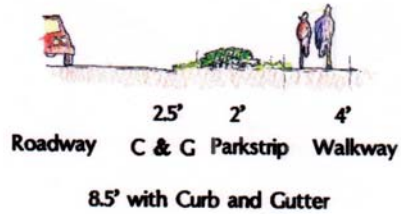
RESIDENTIAL RURAL
ROADWAY SECTION
55' RIGHT OF WAY



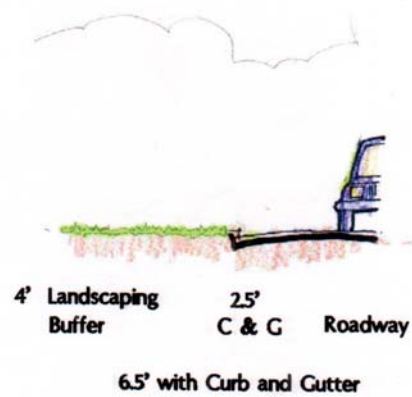
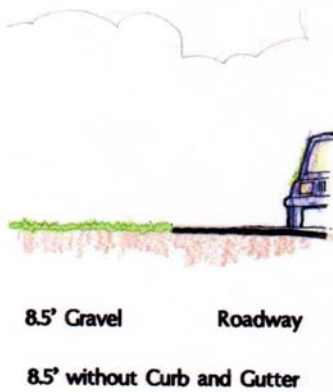
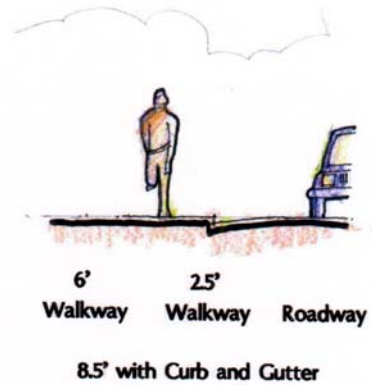
RESIDENTIAL SPECIAL
ROADWAY SECTION
41' RIGHT OF WAY



Standard Beaver Side Treatment



Side Treatment Options



Note 1: Trees to be installed per Beaver City tree ordinances

6 Transportation Improvement Projects

6.1 Recommended Projects

Projects are identified below in priority order. The cost estimates include curb and gutter, sidewalk, pavement placement and removal, drainage, utility relocation, landscaping, structures, lighting, and right-of-way.

Project Rank	Project	Description	Comments/purpose	Cost
UDOT/Beaver 1	Enhancements of North Interchange	Beautification of interchange area	Enhance the entrance into the City	\$500,000
UDOT/Beaver 1	Enhancements of South Interchange	Beautification of interchange area	Enhance the entrance into the City	\$500,000
UDOT/Beaver 2a	MP 1.35-2.02 & MP 2.21-3.02 Safety Study & Improvements SR-160 (Main St.)	Request safety study of UDOT Traffic & Safety Division	Identify types & causes of accidents & make recommendations	\$500,000
UDOT/Beaver 2b	Widen SR-160 Near MP 3.02	Widen SR-160 from two lanes to five lanes	Reduce Congestion	\$700,000
UDOT/Beaver 2c	SR-160 I-15 Ramp to 300 South	Widen from two lanes to five lanes	Reduce congestion	\$1,200,000
UDOT/Beaver 3	Corridor Preservation SR-21 West of Beaver	Purchase additional R/W for future passing lanes, shoulder improvements, safety projects & future widening	Accommodate future widening & traffic needs cost savings	\$1,500,000
UDOT/Beaver 4 Interchange Justification Report	New Interchange I-15 @ SR-21	New interchange	Reduced truck traffic from west on Beaver Main St.	\$26,200,000
UDOT/Beaver 5	SR-21 & SR-160 Intersection Signalization	Warrant and install traffic signal	Decrease in vehicular delay & safety improvements	\$250,000
UDOT/Beaver 5	SR-153 & SR-160 Intersection Signalization	Warrant and install traffic signal	Decrease in vehicular delay & safety improvements	\$250,000
UDOT/Beaver 6	Passing Lanes SR-21 West of Beaver	Construct passing lanes where identifier by future study	Study will be needed	\$3,800,000
UDOT/Beaver 7	Widen SR-21 West of Beaver	Widen SR-21 as truck traffic increases	Need will be accelerated if intermodal center is built	\$40,000,000
Beaver City 1	Master Street Plan	Develop & adopt a master street plan that addresses the	Promotes organized growth, improve traffic flow, increase eligibility for funding	City Staff to complete

		transportation needs of Beaver City	opportunities & economic Development	
Beaver City 2	Trails	Develop prioritized list of proposed trail projects	Improve recreation opportunities promote non-motorized transportation	Final cost to be determined with approved Master Plan
Beaver City 2/3	Sidewalk Construction	Develop prioritized list of needed sidewalks & pursue funding for construction	Safe, walkable community	Final cost to be determined with approved Master Plan
Beaver City 3	Develop Program to Address Issue of Narrow Pavement in Wide R/W	Develop & implement procedures & policies for addressing concern of maintenance of unused portion of street R/W	Develop more walkable aesthetically pleasing streetscape	City Staff to complete
Beaver City 3	Bridge West of Freeway	Construction of bridge over old North Creek and realignment of 1400 North	Reduce traffic congestion and improve safety.	\$50,000.00
Beaver City 3	Realign intersection at 1175 North and Manderfield Highway	Realign 1175 into right-angle intersection	Improve intersection safety and traffic flow. Will be need as 1175 north continues east. A round-about maybe a consideration	\$150,000.00
Beaver City 4	Union Pacific Intermodal Project Coordination	Coordinate with appropriate communities regarding the construction of an intermodal center adjacent to UP rail line	Increased economic development in general area	\$3,400,000
No longer considered	Additional South Interchange	New interchange & connector road to SR-21 routed west of airport (Bean Fields)	By-pass for trucks traffic from Milford	\$27,000,000
No longer considered	By-Pass Road West of I-15 from SR-21 to North Interchange	By-pass road (new highway) construction & R/W widen connection to North interchange (1400 N.)	Reduce truck traffic from west on Beaver Main St.	\$7,300,000

7 Revenue Summary

7.1 Federal and State Participation

Federal and State participation is absolutely necessary for the success of implementing these projects. UDOT needs to see the Transportation Master Plan so that they understand what the City wants to do with its transportation system.

UDOT can then weigh the priorities of the city against the rest of the state. It is very important to lobby for local short term projects to be placed on UDOT's five-year Statewide Transportation Improvement Program (STIP) as soon as possible.

7.1.1 City Participation

The City will be required to participate with the State on funding these projects. There is a local match

component that is required and the percent of the match can vary by the funding source.



A new interchange at I-15 and Center Street is a priority project for Beaver City

7.1.2 Impact Fees, Exactions and Special Improvement Districts

Special improvement districts (SIDs), and exactions can be major contributors to the revenue stream to fund projects. The Transportation Master Plan is a tool that provides technical analysis and justification to warrant establishing significant participation by those who qualify for impact fees, exactions, or SIDs.

Beaver City currently has impact fees for water and sewer projects and has considered impact fees for transportation projects. The City should look at collecting impact fees for transportation projects and determine the benefits and negative impacts..

7.2 Financial Potential

Previous sections of this chapter show significant shortfalls projected for the short-range and long-range programs. The following options may be available to help offset all or part of the anticipated shortfalls:

- Adoption of transportation impact fees.
- Increased general fund allocation to transportation projects.
- General obligation bonds repaid with property tax levies.
- Increased participation by developers, including cooperative programs and incentives.
- Special improvement districts (SIDs), whereby adjacent property owners are assessed portions of the project cost.
- Sales or other tax increase.
- State funding for improvements on the county roadway system.

- Increased gas tax, which would have to be approved by the State Legislature.
- Federal-aid available under one of the programs provided in the federal transportation bill (ISTEA is the current bill; SAFETEA will likely be passed in early 2004).

Increased general fund allocation means that General Funds must be diverted from other governmental services and/or programs. General obligation bonds provide initial capital for transportation improvement projects but add to the debt service of the governmental agency. One way to avoid increased taxes needed to retire the debt is to sell bonds repaid with a portion of the municipalities' State Class monies for a certain number of years.

Participation by private developers provides a promising funding mechanism for new projects. Developers can contribute to transportation projects by constructing on-site improvements along their site frontage and by paying development fees. Municipalities commonly require developers to dedicate right-of-way and widen streets along the site frontage. A negative side of the on-site improvements is that the streets are improved in pieces. If there are not several developers adjacent to one another at the same time, a continuous improved road is not provided. One way to overcome this problem is for the jurisdiction to construct the street and charge the developers their share when they develop their property.

Another way developers can participate is through development fees. The fees would be based on the additional improvements required to accommodate the new development and would be proportioned among each development. The expenditure of additional funds provided by the fees would be subject to the City's spending limit. However, development fees are often a controversial issue and may or may not be an appropriate method of funding projects.

8 Planning Issues and Guidelines

8.1 Guidelines and Policies

This Chapter focuses on guidelines to maintain and promote a safe and efficient transportation system in the future.

8.2 Access Management

This section will define and describe some of the aspects of Access Management for roadways and why it is so important. Access Management can make many of the roads in a system work better and operate more safely if properly implemented. There are many benefits to properly implemented access management. Some of the benefits are as follows:

- Reduction in traffic conflicts and accidents
- Reduced traffic congestion
- Preservation of traffic capacity and level of service
- Improved economic benefits businesses and service agencies
- Potential reductions in air pollution from vehicle exhausts

Though Access Management is generally used on the roads that are larger and have more volume, it can have impacts on those roads that are defined as residential as well.

8.3 Definition

Access management is the process of comprehensive application of traffic engineering techniques in a manner that seeks to optimize highway system performance in terms of safety, capacity, and speed. Access Management is one tool of many that makes a traffic system work better with what is available.

8.3.1 Access Management Techniques

There are many techniques that can be used in access management. The most common techniques are signal spacing, street spacing, access spacing, and interchange to crossroad access spacing. There are various distances for each spacing, dependant upon the roadway type being accessed and the accessing roadway. The Utah Department of Transportation has developed an access management program. More information can be gathered from the UDOT website and from the Access Management Program Coordinator.

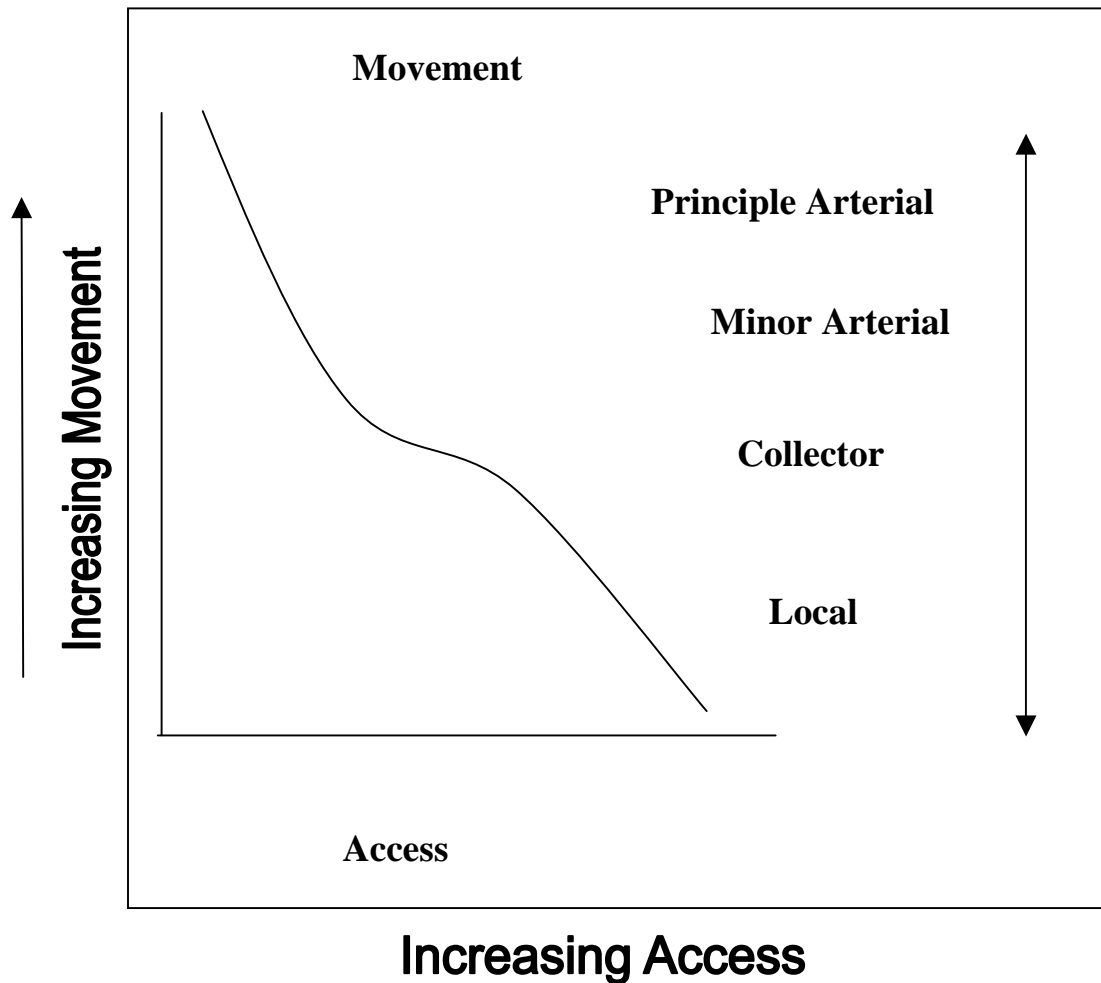


Having effective communication between all interested groups can help to solve problems.

8.3.2 Access Management

Access management is the process in which access is provided from the street network to adjacent land development while preserving traffic flow on the roadway system. Safety, capacity and speed are determining factors on how land development is accessed by a roadway. Managing access is achieved by controlling the location, design and operation of driveways, median openings, and street connections. In addition, auxiliary lanes (turn lanes or by-pass lanes) are also used to divert traffic out of the through traffic stream to improve the traffic flow and improve safety.

Roadways are classified for access control based upon their importance to local and regional mobility. For example, the strictest access control is applied to roadways that serve through traffic or regional trips. The least access control is given to local streets and residential areas that serve local traffic and short trips. The following figure shows the relationship between access and vehicular movement:



8.3.3 Benefits of Access Management

Benefits of access management include:

- Decreased travel time,
- Improved safety,
- Preservation of roadway level of service,
- Reduces the need for expensive roadway and intersection improvements,
- Discourages poor site design, and
- Improves roadway appearance.

8.3.4 Ten ways to manage Roadway Access

There are ten ways to manage roadway access to get the most out of a transportation system, they are:

1. Assure roadways are managed properly, by having a comprehensive plan to address key issues. Include goals, objectives, and policies related to access management. Make sure

roads are classified per the functional classification plan. Provide for a wide variety of street types with varying design standards

2. Establishing a basic requirement that driveways are limited to one per parcel, with special conditions for additional driveways.
3. Locating driveways away from intersections
4. Connecting parking lots and consolidate driveways
5. Providing residential access through neighborhood streets
6. Increasing minimum lot frontage on major roads
7. Promoting a connected street system
8. Encouraging internal access to outparcels
9. Regulating the location, spacing, and design of driveways
10. Coordinate with the Department of Transportation

8.4 Beaver City Access Management rules

The following access management guidelines and policies shall be adhered to within Beaver City.

8.4.1 General Access Principles

Conflicts at intersections and driveways should be separated and the number reduced as much as possible.

A “time-space” perspective should guide (a) the location, timing, and coordination of traffic signals; (b) the placement of access; and (c) the design and operation of intersections. Optimum progressive travel speeds along arterial roadways should be determined and maintained.

Signal cycles should be as short as possible consistent with capacity, pedestrian clearance, and coordination requirements. A cycle length range of 60 to 120 seconds is appropriate. Cycle lengths should not exceed 150 seconds.

Unsignalized access should be located so as not to interfere with queues or maneuvering areas of signalized intersections and positioned to take advantage of gaps in, or less dense, traffic flows.

Interference between through traffic and site traffic should be reduced by removing turning vehicles from through traffic lanes, and by providing adequate on-site storage and driveway dimensions. Fewer, properly placed, and adequately designed driveways are preferable to a larger number of inadequately designed driveways, especially when spaced at least 500 feet apart. In all cases, the integrity of mainline traffic operations must not be compromised.

8.4.2 Number of Accesses per Parcel

Accesses are to be limited to one per lot or development. Additional accesses must be approved by the City Engineer upon completion of a circulation plan or Traffic Impact Study provided to the City indicating that more than one access is required to adequately handle the developments traffic volumes and further indicating that the additional access will not be detrimental to traffic flow on the adjacent street network.

All additional accesses in addition to the one stated above shall not exceed one access for frontage of 300 feet or less, two accesses for 300 to 600 feet of frontage and a maximum of two accesses for frontage greater than 500 feet, as approved by the City Engineer.

Where multiple parcels are consolidated, accesses shall also be consolidated according to City design and spacing standards.

Temporary access may be granted to undeveloped property prior to completion of a final development plan if access is needed for construction or preliminary site access. Temporary accesses are subject to removal, relocation, or redesign after final development plan approval.

8.4.3 Corner Spacing

Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection, and should not be less than the distances shown in Table 5.3. This distance is measured from the PC (point of curve) of the corner curve. A 25' radius is considered the minimum where the existing radius is less than 25'.

Accesses shall not be located within the functional boundaries of intersections as outlined in Table 5.3

8.4.4 Residential Access

New residential developments and subdivisions shall not have driveway access on arterials and major collectors.

Minor subdivisions or “flag lots” are discouraged along arterials and major collectors. Accesses for these minor subdivisions are under the same criteria for design and spacing listed in Table 6.

When two or more accesses serve adjacent single-family residential property, the minimum distance between the nearest points of the two accesses shall be at least 20 feet.

For corner and double frontage residential lots, one access on each frontage may be permitted if it is determined by the City Engineer that two driveways are needed to provide safe access for traffic entering and leaving the lot because of site distance and geometric design considerations.

Single-family residential access driveways shall be a minimum of 12 feet in width and a maximum of 16 feet for a single garage, 20 feet for a double garage, and 24 feet for a triple garage.

Table 6

Access Distance From Corner According to Facility Type

Facility Type	Upstream Distance (feet)	Downstream Distance (feet)
Residential Access	50 ²	50 ²
Local Residential	50 ²	50 ²
Residential Standard	50 ²	50 ²
Residential Collector	100	75
Major Collector	175	150
Minor Arterial ¹	200	185

Major Arterial ¹	250	230
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NOTES:

1. All access points shall be approved by the City Engineer. Distances shown may be adjusted by the City Engineer on a case-by-case basis. Exceptions can only be approved by the City Engineer upon submittal of proper traffic justification.
2. Distances shown are preferred. (See Section 3.2.4.2 K of the Beaver City Engineering Standards)

8.4.5 Medians

- Based upon safety and operational studies, median treatments such as Two-Way-Left-Turn Lanes (TWLTL) and Raised non-Transferable medians may be required on major collector and arterial streets, as determined by the City Engineer.
- Location, Spacing and Design of Intersections and Accesses
- Design of accesses shall be in conformance to all City and UDOT standards, where applicable.
- Accesses serving multi-family and commercial uses shall be a minimum of 25 feet in width and a maximum of 35 feet in width, unless approved by the City Engineer.
- Curb return radii for multi-family and commercial uses shall be a minimum of 20 feet where curb returns are deemed to be necessary.
- Accesses serving industrial uses shall be a minimum of 35 feet in width and maximum of 40 feet in width with minimum curb return radius of 25 feet or as specified by the City Engineer.
- Accesses should be aligned directly with existing access on opposite side of parcel. Where it is not feasible to align driveways, major driveways on opposite side of the street should not be offset less than 150 feet.
- Where commercial lots are not large enough to allow access on opposite sides of the street to be aligned, the center of driveways not in alignment should be offset a minimum of 250 feet on all collector streets, and 300 feet on all major and arterial streets. Greater distances may be required if needed for left-turn storage lanes.
- Where two or more accesses serve the same or adjacent non-single family residential development, the minimum distance between the centerlines of accesses should be at least 200 feet on streets with design speeds below 30 mph and 300 feet on streets with design speeds above 30 mph.
- If adjacent driveways cannot be separated by the distances outlined in Section 3.9.6, they should be combined into a single joint access.
- At least 350 feet of clear sight distance shall be provided for drivers entering or leaving all accesses onto local streets; 400 feet for collector streets; and 500 feet for arterial streets.
- Developers requesting or improving an access(es) along state routes are required to follow UDOT standards.

- The developer is responsible for coordinating all access requests on state routes between both Beaver City and UDOT.
- An access permit or “intent to access” from UDOT is required for all developments with new or modified access on state routes prior to Beaver City issuing a building permit.
- If there is a conflict between UDOT and Beaver City guidelines or requirements, the most restrictive shall apply.

8.5 Where to Use Access Management

Access Management shall be used on all roadways within Beaver City. Roads, like other resources, also need to be carefully managed. Corridor access management strategies extend the useful life of roads at little or no cost to taxpayers. Access management can be used as an inexpensive way to improve performance on a major roadway that is increasing in volume. Access management should be used on new roadways and roadways that are to be improved so as to prolong the usefulness of the roadway

8.6 Bicycles and Pedestrians

Bicycles and identifies the role of bicycles in local transportation, and recommends how to include bicycles as a viable mode of transportation.

Bicycles are typically used for two purposes, commuter travel and recreation. Bicycle commuters generally use the same corridors as automobiles and the bicycle is accommodated on the roadway. AASHTO guidelines recommend a minimum standard width for bicycle lanes of four feet, but many communities are using five feet, which is preferred by bicyclists.

Beaver is developing a bicycle and pedestrian route plan in the near future. Some general guidelines that such a plan should follow include:

- Routes should be chosen to connect local activity centers, including shopping areas and schools;
- Encourage developing a School Routing Plan;
- Routes should follow common travel paths;
- Commuting bicyclists should be accommodated on arterial streets to minimize delay and offer continuity for longer trips, and;
- Preference should be given to lower volume roadways instead of higher volume roadways for on-street bike routes, especially for routes used by school-age children
- Sidewalks should be free of obstacles, such as utility poles, trees and bushes, and should be wide enough to accommodate all pedestrian traffic, including handicapped pedestrians

One way that communities can improve the sidewalks, and even increase the number of them, is through the Transportation Enhancement Funds. The Transportation Enhancement Funds are administered by UDOT and can be used for bicycle and pedestrian projects.

9 Enhancements Program

In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) created the Transportation Enhancement program. The program has since been reauthorized in subsequent bills (i.e. TEA-21). The transportation Enhancement program provides opportunities to use federal dollars to enhance the cultural and environmental value of the transportation system. These transportation enhancements are defined as follows by TEA-21:

“The term ‘transportation enhancement activities’ means, with respect to any project or the area to be served by the project, any of the following activities if such activity relates to surface transportation: provision of facilities for pedestrians and bicycles, provision of safety and educational activities for pedestrians and bicyclists, acquisition of scenic easements and scenic or historic sites, scenic or historic highway programs (including the provision of tourist and welcome center facilities), landscaping and other scenic beautification, historic preservation, rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities and canals), preservation of abandoned railway corridors (including the conservation and use thereof for pedestrian or bicycle trails), control and removal of outdoor advertising, archeological planning and research, environmental mitigation to address water pollution due to highway runoff or reduce vehicle caused wildlife mortality while maintaining habitat connectivity, and establishment of transportation museums.”

The Utah Transportation Commission, with the help of an advisory committee, decides which projects will be programmed and placed on the Statewide Transportation Improvement Program (STIP). Applications are accepted in two-year cycles for the limited funds available to UDOT for such projects. Applications for the current cycle are due December 10, 2003. Beaver City has submitted two applications for the I-15 Interchanges.

10 Transportation Corridor Preservation

10.1 Introduction

Transportation Corridor Preservation will be introduced as a method of helping the city’s Transportation Master Plan. This section will define what Corridor Preservation is and ways to use it to help the Transportation Master Plan succeed for the City.

10.2 Definition

Transportation Corridor Preservation is the reserving of land for use in building roadways that will function now and can be expanded at a later date. It is a planning tool that will reduce future hardships on the public and the city. The land along the corridor is protected for building the roadway and maintaining the right-of-way for future expansion by a variety of methods, some of which will be discussed here.

11 Corridor Preservation Techniques

11.1 Transportation Corridor Preservation

This chapter Identifies and evaluates techniques that can be used to preserve defined corridors for future transportation facilities.

11.2 Introduction

Several recent research efforts have addressed the issue of corridor preservation. The 1990 Report of the American Association of State Highway and Transportation Officials (AASHTO) Task Force on Corridor Preservation provided an identification and evaluation of various techniques. Subsequent efforts of the Federal Highway Administration (FHWA) and Transportation Research Board (TRB) have added to the literature. Drawing from these documents and a brief review of relevant Utah law, this chapter provides a discussion of potential techniques that may have applicability to Beaver City. A bibliography of the relevant publications is included.

11.3 Definitions

For purposes of this discussion, a “corridor” is defined as “the path of a transportation facility that already exists or may be built in the future”. The AASHTO report defines corridor preservation as “a concept utilizing the coordinated application of various measures to obtain control of or otherwise protect the right-of-way for a planned transportation facility”. The AASHTO report further defines the objectives of corridor preservation as follows:

- Prevent inconsistent development
- Minimize or avoid environmental, social, and economic impacts
- Reduce displacement
- Prevent the foreclosure of desirable location options
- Allow for the orderly assessment of impacts
- Permit orderly project development
- Reduce costs

11.4 Corridor Preservation Techniques

Techniques for corridor preservation fall into the following three major categories: (1) acquisition, (2) exercise of police powers, and (3) voluntary agreements and governmental inducements. The various issues associated with each corridor are unique. Therefore, one preservation technique cannot be recommended as the best for all situations. The purpose of this chapter is to provide a “toolbox” of techniques available, a brief summary of each is provided below.

11.4.1 Acquisition

This technique involves the purchase of fee simple or lesser interests in property to bank or preserve it for the corridor location. This could be accomplished using federal funds or by using state funds where a project would be implemented without federal participation. The use of state funds could generally be accomplished with more flexibility and fewer requirements. If federal funds are used, or expected to be used for future elements of the project, certain federally required procedures must be followed. Acquisition can be accomplished in the following ways.

11.4.2 Advance Purchase and Eminent Domain

Undeveloped property is acquired, either by direct purchase or eminent domain, and “banked” until needed for construction. Such a method may systematically acquire the entire right-of-way or it may strategically acquire only selected parcels.

Under Utah statutes, acquisition of property by eminent domain is authorized if (a) the use is authorized by law, (b) the taking is necessary for such use, (c) the construction and use of property will commence within a reasonable time, and (d) fair compensation is paid. Fair value must be paid for interests taken and damages which accrue to the remainder of adjacent property not taken (Utah Code Annotated §78-34-1).

Before property may be taken for a corridor the acquiring agency must identify the corridor location, general route and termini. If the acquiring agency, without reasonable justification, does not commence or complete construction and use of a roadway within the corridor within the time specified, additional damages might be payable to a property owner (Utah Code Annotated §27-12-96).

11.4.3 Hardship Acquisition

Property is acquired to alleviate a particular hardship to a property owner. The hardship must occur as a result of an inability to sell the property due to public awareness of the pending project. Applies only to limited parcel-by-parcel actions in extraordinary or emergency situations (Utah Code Annotated §27-12-96).

11.4.4 Purchase Options

A conditional contract or option is executed that gives the public agency the right but not the obligation to buy the property at a future date. The contract would specify the terms and conditions of the future purchase (Utah Code Annotated §27-12-96).

A related concept involves the use of rights of first refusal under which the government entity obtains the first right to purchase the property when a landowner determines to sell its property.

11.4.5 Development Easements

The government agency purchases development rights or a development easement. The agreement would specify the uses that would be allowed on the land. The public agency would purchase the property owner’s right to develop the land, leaving the owner with all

other rights of ownership. Thus, intensification of and use or development would be precluded.

Existing Utah law provides for conservation easements to maintain land or water areas predominantly in a natural scenic, or open condition, or for recreational, agricultural, cultural, wildlife habitat or other use or condition consistent with the protection of open land. Such easements must be granted to a tax-exempt organization or government agency and cannot be obtained by eminent domain. The easement may be terminated pursuant to conditions set forth in the easement document (Utah Code Annotated §47-18-1).

11.4.6 Public Land Exchanges

Surplus government land is exchanged as compensation for private property needed for right-of-way.

11.4.7 Private Land Trusts

Private land trusts play an increasingly important role in land conservation where public objectives are aligned with private trust objectives. Where government budgets are insufficient to acquire critical tracts in a given time frame, private land trusts may acquire the tracts and hold them for future acquisition by the government

11.4.8 Exercise of Police Powers

Regulatory controls under the police power can be used to control the development of private property in order to preserve the transportation corridor. These measures impose requirements with no compensation to the landowner. Land use and development controls are typically administered by local governments (36 A.L.R.3d 751).

11.4.9 Impact Fees and Exactions

This method involves a mandatory property or monetary contribution by a developer to the local jurisdiction as a condition of a land use approval or permit. These approvals or permits could be associated with a contract zoning, site plan approval, proposed subdivision, special use permit, or other development permission. In most cases, impact fees and exactions can be assessed only after a jurisdiction makes an individualized determination that the required dedication is “roughly proportional “ in both nature and extent to the impact of the proposed development. Impact fees and exactions include the following variations (Utah Code Annotated §11-36-201).

- In-kind contributions – Land owners and developers construct improvements or dedicate land for public facilities or right-of-way within or abutting the development site.
- Monetary payments in lieu of contributions – Developers pay money in lieu of or in addition to in-kind contributions. This method may be used where the pooled contributions of numerous small developments is more effective than individual dedications of small parcels of land. The money is then used to acquire right-of way or make other improvements.

- Impact fees – This method applies to a broader range of improvements whose need is generated by a new development. The effected jurisdiction charges developers for a pro rata share of capital funding for the improvements based on relative contributions to the impacts of the development by newly developed property and existing developments.

Constitutional standards of reasonableness govern the validity and amount of impact fees and exactions. To be constitutional, an impact fee or exaction must be a fair contribution in relation to contributions by others. Thus, an impact fee or exaction must not require newly developed properties to bear more than their equitable share of the capital costs in relation to the benefits conferred.

Seven factors must be considered in analyzing the fairness of an impact fee or exaction (Utah Code Annotated §11-36-201):

1. The cost of existing facilities;
2. The manner of financing existing capital facilities (such as user charges, special assignments, bonded indebtedness, general taxes, or federal grants);
3. The relative extent to which the newly developed properties and other properties in the jurisdiction have already contributed to the cost of existing capital facilities (by such means as user charges, special assignments, or payment from the proceeds of general taxes);
4. The relative extent to which the newly developed properties in the jurisdiction will contribute to the cost of existing capital facilities in the future;
5. The extent to which the newly developed properties are entitled to a credit because the jurisdiction is requiring their developers or owners (by contractual arrangement or otherwise) to provide common facilities (inside or outside the proposed development) that have been provided by the jurisdiction and financed through general taxation or other means (apart from user fees) in other parts of the jurisdiction;
6. Extraordinary costs, if any, in servicing the newly developed properties; and
7. The time-price differential inherent in fair comparisons of amounts paid at different times.

In addition to constitutional limitations, in 1995 the Utah legislature in special session adopted stringent controls on the ability of local government to adopt impact fees to finance development growth. The new act requires that prior to the imposition of an impact fee, a government entity must do the following (*Branberry Development Corporation v South Jordan City*).

- Prepare a capital facilities plan that establishes that impact fees are necessary to achieve an equitable allocation to the costs borne in the past and to be borne in the future in comparison to the benefits already received and yet to be received.
- Prepare a written analysis of the impact fee identifying the impact on the system caused by the development activity, demonstrate how those impacts are reasonably related to the development activity, estimate the proportionate share of the impact

cost that are reasonably related to the new development activity, and identify how the impact fee was calculated.

- Find that an impact fee is reasonably related to the new development based on analyses of specific factors.
- Calculate the impact fee based on a list of defined criteria.
- Hold public hearings on the adoption of the impact fee ordinance.
- Establish a service area within which the jurisdiction calculates and imposes impact fees for various land use categories and either adopts a schedule of such fees by use category or establishes the formula for calculating such fees by use category.

The new act contains other requirements relating to environmental mitigation fees, definitions of public facilities and in some cases detailed standards governing the adoption and administration of impact fees.

11.4.10 Setback Ordinances

A local ordinance establishes a certain distance from a curb, right-of-way, property line, or structure within which construction is prohibited. These requirements may be contained within subdivision ordinances, zoning ordinances or building codes.

Setback requirements do not constitute a compensable taking (*Hargraves v Young*). But if setbacks or minimum lot sizes have the effect of prohibiting all economic use of property for otherwise permitted uses, a taking may occur.

11.4.11 Official Maps or Maps of Reservation

Development is prohibited within proposed right-of-way in areas covered by an official master street plan adopted by the jurisdiction. The official map may be used to plat future as well as existing streets. Generally, prohibition of development must not exceed a reasonable period after the implementing agency is advised of proposed development.

Prior to 1992, Utah law permitted the adoption of an official street map by municipalities and counties. Under prior law, the official street map had the legal effect of prohibiting development within the boundaries of the proposed street unless approved by the legislative body. Beginning in July of 1992, counties and municipalities were specifically prohibited from adopting an official map. Moreover, current law provides that an official map adopted under prior law does not require the municipality or county to acquire the property designated for eventual use as a public street. Utah law also expressly provides that an official map may not be used to unconstitutionally prohibit development of property (Utah Code Annotated §§17-27-7, 10-9-23).

Some courts have held that statutes permitting government to impose a development moratorium on property, located in a proposed transportation corridor during a period of

reacquisition planning, unconstitutionally permits the taking of property without just compensation. Other courts have held that where the purpose of the government action is the prevention of development of land, that would increase the cost of planned future acquisition of such land by government, is unconstitutional. Some courts have found official maps unconstitutional if they also include compensation for the property owner for the period of temporary deprivation of the right to develop. Other statutory schemes have been validated when they allow development to proceed to avoid substantial damage to a property owner (Utah Code Annotated §§17-27-307, 10-9-306).

11.4.12 Adequate Public Facilities and Concurrency Requirements

Some communities address infrastructure needs by adopting ordinances that require a concurrency program intended to ensure that public facilities such as transportation systems are either in place, planned for, or provided as impacts occur from new development. Tools for implementation include carrying capacity limits, development caps, phasing systems, growth rate control, and other similar tools. This concept does not necessarily require developer's pay for improvement, but does require that such improvements be made when development occurs. Advantages and disadvantages of concurrency requirements are listed in Table X.X.

12 Traffic Impact Study

Beaver City may require a Traffic Impact Study for any new development when the following guidelines indicate that a Traffic Impact Study is needed. The following sections are to be used to establish uniform guidelines for when a Traffic Impact Study (TIS) is required and how the study is to be conducted, based on suggested guidelines established by the Institute of Transportation Engineers (ITE) and the American Public Works Association (APWA).

A TIS is a specialized study of the impacts that a certain type and size of development will have on the surrounding transportation system. It is specifically concerned with the generation, distribution, and assignment of traffic to and from the "new development". The term "new development" also includes properties that are being redeveloped.

12.1 When Required

A TIS shall be required for all new developments or additions to existing developments which generate 100 or more trips during the morning, afternoon or Saturday peak hours or which will have a significant impact on the City's transportation system as determined by the City Engineer.

The Traffic Impact Studies will help the city determine the required functional classification for each roadway in the development. Traffic Impact Studies are divided into three categories. The scale of development will determine which category of study will be required. Each category differs by specific analysis requirements for the study and study's level of detail. Below is a description of each category.

12.1.1 CATEGORY I

A Category I TIS should be required for all developments which generate one hundred (100) or more new peak hour trips, but less than five hundred (500) trips, during the morning, afternoon or Saturday peak hour. Peak hour trips will be determined by the latest edition ITE *Trip Generation* Manual.

In addition to the above threshold requirements, a Category I TIS may also be required by the City Engineer for any specific traffic problems or concerns such as:

Proposed or existing offset intersections,
Situation with a high number of traffic accidents,
Driveway conflicts with adjacent developments,
Nearby intersections that have reached their capacity,
Proposed property rezones when there is a significant potential increase in traffic volumes, and
When the original TIS is more than two years old, or where the proposed traffic volumes in the original TIS increase by more than twenty percent.

For a Category I TIS, the study horizon should include the opening year of the development, and build-out of the entire development, if applicable.

The minimum study area should include site access drives, affected signalized intersections and major unsignalized street intersections.

12.1.2 CATEGORY II

A Category II TIS should be required for all developments, which generate from five hundred (500) to one thousand (1,000) peak hour trips during the morning, afternoon or Saturday peak hour.

The study horizon should include the opening year of the development, year of completion for each phase of the development, if applicable, and five years after the development's completion.

The minimum study area should include the site access drives and all signalized intersections and major unsignalized street intersections within one-half mile of the development.

12.1.3 CATEGORY III

A Category III TIS should be required for all developments, which generate above one thousand (1,000) peak hour trips during the morning, afternoon or Saturday peak hour.

The study horizon shall be for the year of completion for each phase of the development, the year of its completion, five years after the development's completion and ten years after the development's completion.

The minimum study area shall include the site access drives and all signalized intersections and major unsignalized street intersections within one-half mile of the development.

12.2 Initial Work Activity

A developer, or their agent, should first estimate the number of vehicular trips to be generated by the proposed development to determine if a TIS may be required and if so, to determine the applicable category. The City must give concurrence on the number of trips to be generated by the proposed development. The developer may, if desired, request that the City assist in estimating the number of trips for the purpose of determining whether a TIS is required for the proposed development.

The City Engineer or designated representative shall make the final decision on requiring a TIS and determining whether the study falls within Category I, II or III.

If a study is determined to be required by the City Engineer, the developer should prepare for submittal to the City, for review and approval, a draft table of contents for the TIS. The table of contents will be sufficiently detailed to explain the proposed area of influence for the study, intersections and roadways to be analyzed, and level of detail for gathering of traffic volume information and preparation of level of service analyses. There should also be included in the draft a proposed trip distribution for site traffic. After approval of the draft table of contents and trip distribution by the City, the actual TIS work activities may begin.

The Traffic Impact Study Scope of Work agreement between the developer and his/her traffic engineer should conform to the pre-approved draft table of contents. The findings, conclusions and recommendations contained within the TIS document should be prepared in accordance with appropriate professional Civil Engineering Canons.

12.3 Qualifications for Preparing Traffic Impact Study Documents

The TIS should be conducted and prepared under the direction of a Professional Engineer (Civil) licensed to practice in the State of Utah. The subject engineer should have special training and experience in traffic engineering and be a member of the Institute of Transportation Engineers (ITE). The final report shall be sealed, signed and dated.

12.4 Analysis Approach and Methods

The traffic study approach and methods should be guided by the following criteria.

12.4.1 Study Area

The minimum study area should be determined by project type and size in accordance with the criteria previously outlined. The extent of the study area may be either enlarged or decreased, depending on special conditions as determined by the City.

12.4.2 Study Horizon Years

The study horizon years should be determined by project type and size, in accordance with the criteria outlined in Section 5.1 When Required.

12.4.3 Analysis Time Period

Both the morning and afternoon weekday peak hours should be analyzed, unless the proposed project is expected to generate no trips, or a very low number of trips, during either the morning or evening peak periods. If this is the case, the requirement to analyze one or both of these periods may be waived by the City.

Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example mid-day), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, these additional peak hours should also be analyzed.

12.4.4 Seasonal Adjustments

When directed by City, the traffic volumes for the analysis hours should be adjusted for the peak season, in cases where seasonal traffic data is available.

12.4.5 Data Collection Requirements

All data should be collected in accordance with the latest edition of the ITE *Manual of Traffic Engineering Studies*, or as directed by City.

- **Turning movement counts:** Manual turning movement counts should be obtained for all existing cross-street intersections to be analyzed during the morning, afternoon and Saturday peak periods (as applicable). Turning movement counts may be required during other periods as directed by the City. Turning movement counts may be extrapolated from existing turning movement counts, no more than two years old, with the concurrence of the City.
- **Daily traffic volumes:** The current and projected daily traffic volumes should be presented in the report. If available, daily count data from the local agencies may be extrapolated to a maximum of two years with the concurrence of the City. Where daily count data is not available, mechanical counts will be required at locations agreed upon by the City.
- **Roadway and Intersection geometrics:** Roadway geometric information should be obtained. This includes, but is not limited to, roadway width, number of lanes, turning lanes, vertical grade, location of nearby driveways, and lane configuration at intersections.
- **Traffic control devices:** The location and type of traffic controls should be identified at all locations to be analyzed.

12.5 Trip Generation

The latest edition of ITE's *Trip Generation* Manual should be used for selecting trip generation rates. Other rates may be used with the approval of the City in cases where *Trip Generation* does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been shown to differ from the ITE rates.

Site traffic should be generated for daily, AM, PM and Saturday peak hour periods (as applicable). Adjustments made for "pass-by", "diverted-link" or "mixed-use" traffic volumes shall follow the methodology outlined in the latest edition of the ITE *Trip Generation* Manual or the ITE *Trip Generation Handbook*. A "pass-by" traffic volume discount for commercial centers should not exceed twenty-five percent unless approved by the City.

A trip generation table should be prepared by phase showing proposed land use, trip rates, and vehicle trips for daily and peak hour periods and appropriate traffic volume adjustments, if applicable.

12.6 Trip Distribution and Assignment

Projected trips should be distributed and added to the projected non-site traffic on the roadways and intersection under study. The specific assumptions and data sources used in deriving trip distribution and assignment should be documented in the report and reviewed with the City Engineer. Future traffic volumes should be estimated using information from transportation models, or applying an annual growth rate to the base-line traffic volumes. The future traffic volumes should be representative of the horizon year for project development. If the annual growth rate method is used, the City must give prior approval to the growth rate used. In addition, any nearby proposed development projects currently under review by the City ("on-line") should be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed "on-line" projects should be compared to the increase in traffic by applying an annual growth rate.

If modeling information is unavailable, the greatest traffic increase from either the "on-line" developments, the application of an annual growth rate or a combination of an annual growth rate and "on-line" developments, should be used to forecast the future traffic volumes.

The site-generated traffic should be assigned to the street network in the study area based on the approved trip distribution percentages. The site traffic should be combined with the forecasted traffic volumes to show the total traffic conditions estimated at development completion. A "figure" should be prepared showing daily and peak period turning movement volumes for each traffic study intersection. In addition, a "figure" should be prepared showing the base-line volumes with site-generated traffic added to the street network. This "figure" should be prepared showing the base-line volumes with site-generated traffic added to the street network. This "figure" will represent site specific traffic impacts to existing conditions.

12.7 Capacity Analysis

Level of service (LOS) shall be computed for signalized and unsignalized intersections in accordance with the latest edition of the *Highway Capacity Manual*. The intersection LOS should be calculated for each of the following conditions (if applicable):

Existing peak hour traffic volumes (“figure” required).

Existing peak hour traffic volumes including site-generated traffic (“figure” required).

Future traffic volumes not including site traffic (“figure” required).

Future traffic volumes including site traffic (“figure” required).

LOS results for each traffic volume scenario (“table” required).

The LOS table should include LOS results for AM, PM and Saturday peak periods, if applicable. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections, and LOS conditions for the critical movements at unsignalized intersections. For signalized intersections, the LOS conditions and average vehicle delay shall be provided for each approach and the intersection as a whole.

If the new development is scheduled to be completed in phases, the TIS will, if directed by the City, include an LOS analysis for each separate development phase in addition to the TIS for each horizon year. The incremental increases in site traffic from each phase should be included in the LOS analysis for each preceding year of development completion. A “figure” will be required for each horizon year of phased development.

12.8 Traffic Signal Needs

A traffic signal needs study should be conducted for all new proposed signals for the base year. If the warrants are not met for the base year, they should be evaluated for each year in the five-year horizon.

Traffic signal needs studies should be conducted by a method pre-approved by City.

Speed Considerations

Vehicle speed is used to estimate safe stopping and cross corner sight distances. In general, the posted speed limit is representative of the 85th percentile speed and should be used to calculate safe stopping and cross corner sight distances.

Improvement Analysis

The roadways and intersections within the study area should be analyzed, with and without the proposed development to identify any projected impacts in regard to LOS and safety.

Where the highway will operate at LOS C or better without the development, the traffic impact of the development on the roadways and intersections within the study area should be mitigated to LOS D for arterial and collector streets and LOS C on all other streets during peak hours of travel. Mitigation to LOS D on other streets may be acceptable with the concurrence of the City Engineer.

12.9 Report Format

This section provides the format requirements for the general text arrangement of a TIS. Deviations from this format must receive prior approval of the City.

I. INTRODUCTION AND SUMMARY

1. Purpose of Report and Study Objectives
2. Executive Summary
 - Site Location and Study Area
 - Development Description
 - Principal Findings
 - Conclusions
 - Recommendations

II. PROPOSED DEVELOPMENT

1. Off-Site Development
2. Description of On-Site Development
 - Land Use and Intensity
 - Location
 - Site Plan
 - Zoning
 - Development Phasing and Timing

III. STUDY AREA CONDITIONS

1. Study Area
 - Area of Significant Traffic Impact
 - Influence Area
2. Land Use
 - Existing Land Use and Zoning
 - Anticipated Future Development
3. Site Accessibility
 - Existing and Future Area Roadway System
 - Traffic Volumes and Conditions
 - Access Geometrics
 - Other as applicable

IV. ANALYSIS OF EXISTING CONDITIONS

1. Physical Characteristics
 - Roadway Characteristics
 - Traffic Control Devices
 - Pedestrian/Bicycle Facilities

2. Traffic Volumes
 - Daily, Morning, Afternoon and Saturday Peak Periods (as applicable)
3. Level of Service
 - Morning, Afternoon and Saturday Peak Hour (as applicable)
4. Safety

V. PROJECTED TRAFFIC

1. Site Traffic Forecasts (each horizon year)
 - Trip Generation
 - Mode Split
 - Pass-by Traffic (if applicable)
 - Trip Distribution
 - Trip Assignment
2. Non-Site Traffic Forecasting (each horizon year)
 - Projections of Non-site (Background) Traffic (methodology for the projections shall receive prior approval of City)
3. Total Traffic (each horizon year)

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

1. Site Access
2. Capacity and Level of Service Analysis
 - Without Project (for each horizon year including any programmed improvements)
 - With Project (for each horizon year, including any programmed improvements)
3. Roadway Improvements
 - Improvements Programmed to Accommodate Non-site (Background) Traffic
 - Additional Alternative Improvements to Accommodate Site Traffic
4. Traffic Safety
 - Sight Distance
 - Acceleration/Deceleration Lanes, Left-Turn Lanes
 - Adequacy of Location and Design of Driveway Access
5. Pedestrian Considerations
6. Speed Considerations
7. Traffic Control Needs
8. Traffic Signal Needs (base plus each year, in five-year horizon)
9. Site Circulation and Parking

VII. FINDINGS

1. Site Accessibility
2. Traffic Impacts
3. Need for Improvements
4. Compliance with Applicable Local Codes

VIII. RECOMMENDATIONS/CONCLUSIONS

1. Site Access/Circulation Plan
2. Roadway Improvements

- On-Site
- Off-Site
- Phasing (as applicable)
- 3. Transportation System Management Actions (as applicable)
- 4. Other

IX. APPENDICES

1. Existing Traffic Volume Summary
2. Trip Generation/Trip Distribution Analysis
3. Capacity Analyses Worksheets
4. Traffic Signal Needs Studies

X. FIGURES AND TABLES

1. The following items shall be documented in the text or Appendices
 - Site Location
 - Site Plan
 - Existing Transportation System
 - Existing Peak Hour Turning Volumes
 - Estimated Site Traffic Generation
 - Directional Distribution of Site Traffic
 - Site Traffic
 - Non-Site Traffic
 - Total Future Traffic
 - Projected Levels of Service
 - Recommended Improvements

(For Category 1, many of the items may be documented within the text. For other categories the items shall be included in figures and/or tables which are legible.)

XI. DESIGN STANDARD REFERENCE

1. Design in accordance with current *Beaver City Engineering Standards*.
2. Conduct capacity analysis in accordance with the latest edition of the *Highway Capacity Manual*.